DOCUMENT RESUME

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IDENTIFIERS	*Computer Assisted Engineering

ABSTRACT

This tech prep competency profile covers the occupation of electronics technician. Section 1 provides the occupation definition. Section 2 lists development committee members. Section 3 provides the leveling codes--abbreviations for grade level, (by the end of grade 12, by the end of associate degree), academic codes (communications, math, or science related), and depth (introduce, reinforce, proficient). Section 4, the table of contents, also indicates whether the entire or partial unit is required for each of the occupations. Section 5 provides the competencies categorized into 35 units. Each unit consists of essential or local competencies divided into builders. Competencies and builders are listed in columns and followed by the codes that indicate depth and related academic area for each grade level. Unit topics are as follows: employability skills; professionalism; teamwork; professional practices; workplace safety; project management; problem analysis; general administrative functions; economic and business principles; basic computer concepts and applications; quality assurance; technical recording and reporting; drafting technology; computer-assisted design and drafting (CADD) fundamentals; intermediate CADD; basic electricity; fundamentals of electronics technology; electronic noise; analog circuits; digital logic circuits; microcomputer electronics technology; instrumentation and control technology; electro-optic technology; electronics troubleshooting and repair; programmable logic controllers; communications electronics technology; industrial electricity; electrical test and measurement equipment; electromechanical technology; hydraulics and pneumatics; computer-aided engineering; wiring methods; electronic assembly and repair; local area network operations; and mechanical power transmission. (YLB)

ELECTRONICS TECHNOLOGY

Tech Prep Competency Profile

April 1999

TECH PREP

Lakeland Tech Prep Consortium
7700 Clocktower Drive
Kirtland, Ohio 44094-5198
(440) 953-7235
FAX (440) 975-4329

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Lakeland Tech Prep Consortium
7700 Clocktower Drive
Kirtland, Ohio 44094-5198
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FAX (440) 975-4329

Lakeland Tech Prep Consortium
Electronics Technology
Tech Prep Competency Profile

Occupation Definition

April 1999

An ***ELECTRONICS TECHNICIAN*** builds, evaluates, troubleshoots, and maintains electronics products and systems by utilizing specialized skills and equipment to ensure product quality.

Lakeland Tech Prep Consortium

Instructions for Use of Competency Profile Access Database

This database was created in Access 2.0. It can be loaded into later versions of Access.

The name of the file is:	electronics:	ltpc-elc.mdb
	manufacturing:	ltpc-mfg.mdb

The following reports are available using the database:

- Full Report
- High School Competencies
- High School Competencies and Builders
- Associate Degree Competencies
- Associate Degree Competencies and Builders
- High School "Introduce" Competencies and Builders
- High School "Proficient" Competencies and Builders
- Associate Degree "Introduce" Competencies and Builders
- Associate Degree "Proficient" Competencies and Builders
- Communications Related Competencies and Builders
- Mathematics Related Competencies and Builders
- Science Related Competencies and Builders

To obtain a report, open the database, click on "Reports", and double click the report you wish to see or print.

Please feel free to add fields or links to a student database in order to assist you in tracking student progress or preparing career passports. Fields could also be added to include performance objectives, lesson plans, etc.

No changes should be made to the competencies or the leveling except by the Lakeland Tech Prep Consortium office.

If you have any questions on the database, please call the Tech Prep Office at 953-7235 or Linda Fauber at (410) 747-9825.

Lakeland Tech Prep Consortium
Electronics Technology
Tech Prep Competency Profile

Development Committee
April 1999

Facilitator

Mrs. Linda Fauber
Certified TCP Facilitator

Industry Representatives

Mr. Scott Brancel
Product Engineer
APSCO, Inc.
3700 Lane Rd.
Perry, OH 44081

Mr. Dana Davis
Manufacturing Manager
Gould/Spectra Therma
8333 Rockside Rd.
Valley View, OH 44125

Mr. Greg Freeman
Manager, Systems Test
Bailey Controls
29801 Euclid Ave.
Wickliffe, OH 94092

Mr. Gerald Iannadrea
Senior Engineer
MicroDimensions
7345 Production Blvd.
Mentor, OH 44060

Mr. Nicholas Mormino
Research & Development Technician
Lincoln Electric
22801 St. Clair Ave.
Euclid, OH 44117-1199

Education Representatives

Mr. Bryon Banks
Lake Shore Compact
7700 Clocktower Dr.
Kirtland, OH 44094

Mr. Paul Brockett
Ashtabula County JVS
1565 St. Rte. 167
Jefferson, OH 44047

Mr. Mike Haines
Auburn Career Center
8140 Auburn Rd.
Concord, OH 44077

Mr. Herb Hall
Lakeland Community College
7700 Clocktower Dr.
Kirtland, OH 44094

Mr. Steve Kaminsky
Mayfield Excel TECC
6116 Wilson Mills Rd.
Mayfield, OH 44143

Mr. Bob Mason
Lakeland Community College
7700 Clocktower Dr.
Kirtland, OH 44094

Mr. Rich Olsen
Ashtabula County JVS
1565 St. Rte. 167
Jefferson, OH 44047

Ms. Heike Robinson
Lake Shore Compact
7700 Clocktower Dr.
Kirtland, OH 44094

Engineering Technologies Futuring Panel
April 14, 1998

Facilitator: Linda Fauber

Blaine Lilly, Assistant Professor
Department of Mechanical Engineering
The Ohio State University
Columbus, Ohio

Keith Rosnell, President
MBS Engineering Solutions
Cincinnati, Ohio

Larry Tracewell
Tracewell Systems
Westerville, Ohio

Per Flem
Performance Plastics
Cincinnati, Ohio

Engineering Technologies State Competency Profile Meeting
Business, Industry, Labor Panel
May 1998

Facilitators:
Linda Fauber
Jenny Royer

Beth Adams, Director, Special Projects, Administration
General Tool Company, Cincinnati, Ohio

Perry Ballinger, Telecommunications Engineer, Electronics
First Energy Corporation/Ohio Edison, Massillon, Ohio

Michael Bentley, Maintenance Supervisor
Merillat Industries, Jackson, Ohio

Steve Combs, Training Coordinator, Electrical Department
Delphi Harrison, Dayton, Ohio

Rick Fath, Facilities Manager, Maintenance
XTek, Inc., Cincinnati, Ohio

Hadley Kline, President
Cuyahoga Plastics, Cleveland, Ohio

Robert C. Mitchell, President
Mitchell Electrical Contracting/RCM Construction, Inc., Steubenville, Ohio

Ruel Mitchell, Vice President
Mitchell Electrical Contracting/RCM Construction, Inc., Steubenville, Ohio

Glenn Myres, Senior Electrical Engineer
Malcolm Pirnie, Inc., Columbus, Ohio

Craig A. Petrella, Training Specialist, Craft & Apprentice Training, H.R.
Weirton Steel Corp., Weirton, West Virginia

Lance Rehberg, Supervisor, Tech. Adm., Drawing Management
Sprint, Mansfield, Ohio

Keith Rosnell, President/CEO
MBS Engineering Solutions, Cincinnati, Ohio

Steven Schmidt, Director, Engineering
APSCO Inc., Perry, Ohio

Bob Sintobin, Lab Tech, Elec/Mech
Toledo Technology Academy/Sears, Toledo, Ohio

Alan Smith, Assistant Engineering Manager
Creative Control Designs, Inc., Reynoldsburg, Ohio

Eugene Stepanik, Training Director, Electrical Department
Cleveland Electrical JATC, Valley View, Ohio

Jeff R. VanZant, QC, CNC Program Purchasing Supervisor, Industrial Manufacturing Tech.
Houston Machine Products, Inc., Springfield, Ohio

Mark Winnett, Director, Order Fulfillment, Plant Operations
DAYCO Products, Inc., Swan Hose Plant, Retail Business Unit, Bucyrus, Ohio

Engineering Technologies State Competency Profile Meeting
Educator Panel
May 1998

Facilitators:
Jan Eley
Julie Daugherty

David Ackerman, Electronics Instructor
Belmont Harrison JVS, St. Clairsville, Ohio

Jan Adams, Coordinator, Tech-Prep Educational Partnerships, Applied Science
Firelands College - BGSU, Huron, Ohio

David Andrews, Vocational Education Teacher
Patterson Career Centers, Dayton Public Schools, Dayton, Ohio

Robert Ballinger, Vocational Electronics Educator
Perry High School, Massillon, Ohio

Patrick Beech, CADD Drafting Instructor, T&I
Madison High School, Mansfield, Ohio

Dave Bittner, Engineering Technology Educator
Lakeland Community College, Kirtland, Ohio

Steve Bowman, Quality Support Leader & Supervisor, T&I
Great Oaks Institute of Technology & Career Development, Cincinnati, Ohio

Tracy Burden, Correlated Math Teacher
Madison High School, Mansfield, Ohio

David Campbell, Electronics Instructor
Northwest Career Center, Cincinnati, Ohio

Wayne Caudill, Math/Science Teacher
Muskingum-Perry Career Center, Mid-East Ohio Vocational School District, Zanesville, Ohio

George Clonch, Manufacturing Educator
University of Rio Grande, Rio Grande, Ohio

Dave Copsey, Electronics Instructor, Career & Technology
Clay High School, Oregon, Ohio

Tom Currie, Chair, Electronic Engineering Technology
Columbus State Community College, Columbus, Ohio

Jim Davis, Associate Professor, EET
Muskingum Technical College, Zanesville, Ohio

Ky Davis, Mathematics Instructor
Muskingum Technical College, Zanesville, Ohio

Tim Dean, Electrical Instructor, T&I
Madison High School, Mansfield, Ohio

David Devier, Dean, Industrial & Engineering Technologies
Owens Community College, Toledo, Ohio

Ray A. DiPilla, Program Chair, Electro-Mechanical Engineering Technology
Cincinnati State Technical & Community College, Cincinnati, Ohio

Matthew Dudas, Electronics Instructor
Muskingum-Perry Career Center, Zanesville, Ohio

Daniel Durfee, Professor, Engineering & Science, Environmental Department
Muskingum Technical College, Zanesville, Ohio

Michael Dyer, Manufacturing Educator
Buckeye Hills Career Center, Rio Grande, Ohio

Maxine Ewig, Project Director
Toledo Technical Academy, Toledo, Ohio

Sophie Garrity, Science Teacher
Belmont Career Center, St. Clairsville, Ohio

Nancy K. Gilson, English Professor
Marion Technical College, Marion, Ohio

Thurman Grass, EET Coordinator
Lima Technical College, Lima, Ohio

Mike Haines, Tech Prep Electronics Teacher
Auburn Career Center, Concord Township, Ohio

Herbert Hall, Chair, Electronics Technology, EET
Lakeland Community College, Kirtland, Ohio

Connie Hilty, Applied Communications/English
Muskingum-Perry Career Center, Zanesville, Ohio

Steve Jefferson, CADD Drafting Instructor
Know County Career Center, Mt. Vernon, Ohio

Doug Kepp, Chair, Computer Integrated Manufacturing
Lakeland Community College, Kirtland, Ohio

Jason S. Kernahan, Industrial Arts/Tech Prep Manufacturing Instructor
Buckeye Local High School, Rayland, Ohio

Deb Knigga, Communications Administrator
Firelands College - BGSU, Huron, Ohio

Michael Kouse, Electronics Instructor
Ohio Hi-Point Career Center, Bellefontaine, Ohio

Brian Kelly Kurth, Engineering/Mathematics Instructor
Belmont Technical College, St. Clairsville, Ohio

James Laremore, Curriculum Chair, Engineering Technology, Science & Communications Division
Terra Community College, Fremont, Ohio

Tecca Larrick, Engineering Technology Teacher
Buckeye Career Center, New Philadelphia, Ohio

Debbie Massari, Assistant Professor, Mathematics
Cuyahoga Community College, Parma, Ohio

Kathleen McCabe, English Professor
Terra Community College, Fremont, Ohio

Kerry McClure, Instructor, Architecture/Construction Management
Eastland Vocational Satellite, Gahanna Lincoln High School, Gahanna, Ohio

Jim McIntyre, Engineering Technology Teacher
EHOVE Vocational School, Milan, Ohio

Terry Metz, Associate Professor, Physics/Engineering Technology
Marion Technical College, Marion, Ohio

Donald Moran, Engineering Instructor
Central Ohio Technical College, Newark, Ohio

Robert Morley, Tech Prep Instructor
Jefferson County JVS, Bloomingdale, Ohio

James Mumaw, Teaching/Learning Chair, Electronics Technology, Science & Communications Division
Terra Community College, Fremont, Ohio

Michelle Olecki, English Teacher
Madison High School, Mansfield, Ohio

Richard Patterson, Tech Prep Instructor, Engineering
Trumbull County JVS, Kent State University, Warren, Ohio

Harold Pearson, Professor, Robotics
Sinclair Community College, Dayton, Ohio

Mark D. Pumphrey, Manufacturing Engineering Technology Instructor
Muskingum-Perry Career Center, Mid-East Ohio Vocational School District, Zanesville, Ohio

Ron Quillen, Department Head, Industrial Engineering
Stark State College of Technology, Canton, Ohio

Ritch Ramey, Tech Prep Instructor, Engineering
Marion Technical College, Marion, Ohio

John W. Romick, Industrial Manufacturing Coordinator
Belmont Career Center, St. Clairsville, Ohio

Joel Rudinger, Engineering Professor
Firelands College - BGSU, Huron, Ohio

Les Ryle, OWA Teacher/Coordinator
Elgin Local Schools, Marion, Ohio

Brent Sanders, Principles of Technology Teacher, T&I
Madison High School, Mansfield, Ohio

Carmen Santone, Tech Prep Instructor, Engineering
Trumbull County JVS, Kent State University, Warren, Ohio

Mike Smith, Engineering Design Teacher
Hamilton City Schools, Hamilton, Ohio

Brian Sneider, Industrial Technology Teacher
Technology Center, Vanguard-Sentinel JVSD, Fremont, Ohio

Ronald Summers, Senior Teacher, Tech Prep Manufacturing
Springfield-Clark JVS, Springfield, Ohio

Dale Toukonen, Instructor, Tech Prep Computer Integrated Manufacturing Technology
Auburn Career Center, Concord Township, Ohio

Robert Walder, Associate Professor, Engineering Technology
Clark State Community College, Springfield, Ohio

Rudy G. Wojtecki, Assistant Professor, MERT
Kent State University, Trumbull Campus, Warren, Ohio

Jeff Woodson, Faculty, Mechanical Engineering Technology
Columbus State Community College, Columbus, Ohio

Alexandria S. Yavelak, Applied Math/English Teacher
Belmont-Harrison Career Center, St. Clairsville, Ohio

Tom Yeater, Engineering Program Director
North Central Technical College, Mansfield, Ohio

Don Yetzer, Tech Prep Instructor, Engineering Design, T&I
Colerain Career Center, Cincinnati, Ohio

Lakeland Tech Prep Consortium
Electronics Technology
Tech Prep Competency Profile

LEVELING CODES

GRADE LEVEL:

12 = by the end of grade 12

AD = by the end of the Associate Degree

AC = ACADEMIC CODES:

C = Communications related

M = Math related

S = Science related

DEPTH (indicated in the 12 or AD column):

I = Introduce

R = Reinforce or add depth (after introducing or proficiency)

P = Proficient (able to perform the skill without supervision)

ESSENTIAL COMPETENCY:

The State Business, Industry and Labor Panel determined that the competency is needed to ensure **minimal** level of employability. Entry level employees should be able to perform this competency without supervision. All essential competencies must be included in local profiles for the occupation(s) and must be leveled "P" by the end of either the 12th grade or the Associate Degree.

RECOMMENDED COMPETENCY:

The local Development Committee in April 1999 determined that the competency should be included in the profile. It may have been suggested by either the State Panel or the local Development Committee. Leveling was determined by the local Development Committee.

Lakeland Tech Prep Consortium
Tech Prep Competency Profile
Electronics Technology
April 1999

Page	Unit	Unit Required
1	1. Employability Skills	X
9	2. Professionalism	X
13	3. Teamwork	X
16	4. Professional Practices	X
18	5. Workplace Safety	X
20	6. Project Management	X
21	7. Problem Analysis	X
22	8. General Administrative Functions	X
24	9. Economic and Business Principles	X
27	10. Basic Computer Concepts and Applications	X
40	11. Quality Assurance	X
44	12. Technical Recording and Reporting	X
46	13. Drafting Technology	X
48	14. CADD Fundamentals	X
51	15. Intermediate CADD	X
53	16. Basic Electricity	X
59	17. Fundamentals of Electronics Technology	X
61	18. Electronic Noise	X
62	19. Analog Circuits	X
65	20. Digital Logic Circuits	X
68	21. Microcomputer Electronics Technology	X
71	22. Instrumentation and Control Technology	X
73	23. Electro-Optic Technology	X
75	24. Electronics Troubleshooting and Repair	X
81	25. Programmable Logic Controllers (PLCs)	X
82	26. Communications Electronics Technology	X
84	27. Industrial Electricity	X
91	28. Electrical Test and Measurement Equipment	X
93	29. Electromechanical Technology	X
94	30. Hydraulics and Pneumatics	X
96	31. Computer Aided Engineering (CAE)	X
97	32. Wiring Methods	X
98	33. Electronic Assembly and Repair	X
99	34. Local Area Network (LAN) Operations	X
100	35. Mechanical Power Transmission	X

Lakeland Tech Prep Consortium
Electronics Technology
Competency Profile - April, 1999

Code / Number	*Unit/Competency/Builder*	*12*	*AD*	*AC*
U 01.00.00	**Employability Skills**			
EC 01.01.00	**Develop a career plan**	**P**	**R**	**CMS**
B 01.01.01	Identify current interests and aptitudes	P	R	
B 01.01.02	Identify common barriers to employment	P	R	
B 01.01.03	Describe strategies to overcome employment barriers	P	R	
B 01.01.04	Locate resources for finding employment	P	R	
B 01.01.05	Research job trends	P	R	
B 01.01.06	Identify career options	P	R	
B 01.01.07	Identify advantages and disadvantages of career options (in addition to monetary)	P	R	
B 01.01.08	Identify job requirements	P	R	
B 01.01.09	Investigate education/training opportunities	P	R	
B 01.01.10	Evaluate personal strengths and weaknesses	P	R	

U = Unit Name
EC = Essential Competency (determined by State Panel)
[illegible]cal Competency (may have been
[illegible]ommended by State Panel or Local Panel)
[illegible]ilder

I = Introduce
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C, M, S = Communications, Math or Science related

Code / Number		Unit/Competency/Builder	12	AD	AC
EC	**01.02.00**	**Prepare for employment**	**P**	**R**	**CMS**
B	01.02.01	Identify traditional and non-traditional employment sources	P	R	
B	01.02.02	Identify present and future employment opportunities (by geographic location)	P	R	
B	01.02.03	Research job opportunities, including non-traditional careers	P	R	
B	01.02.04	Compare salary ranges and benefit packages	P	R	
B	01.02.05	Compile occupational profile	P	R	
B	01.02.06	Identify rights and responsibilities of equal employment opportunity laws	P	R	
B	01.02.07	Design resume and cover letter	P	R	
B	01.02.08	Secure references	P	R	
B	01.02.09	Investigate generic and specific employment tests (e.g., civil service exam; drug screening)	P	R	
B	01.02.10	Use follow-up techniques to enhance employment potential	P	R	
B	01.02.11	Demonstrate legible written communication skills using correct grammar, spelling, punctuation, and concise wording	P	R	
B	01.02.12	Describe methods for handling illegal questions on job application forms and during interviews	P	R	
B	01.02.13	Write letter of application	P	R	
B	01.02.14	Research prospective employer and services performed	P	R	
B	01.02.15	Explain critical importance of personal appearance, hygiene, and demeanor	P	R	
B	01.02.16	Interpret job description	P	R	
B	01.02.17	Demonstrate appropriate interview question and answer techniques	P	R	
B	01.02.18	Demonstrate methods for handling difficult interview questions	P	R	
B	01.02.19	Evaluate job offers	P	R	

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	Code / Number	Unit/Competency/Builder	12	AD	AC
B	01.02.20	Write letter of acceptance	P	R	
B	01.02.21	Write letter of declination	P	R	
B	01.02.22	Demonstrate good listening skills	P	R	
B	01.02.23	Ask for the job tactfully	P	R	
B	01.02.24	Participate in extracurricular activities (e.g., student government, community projects)	P	R	
EC	**01.03.00**	**Evaluate the importance of self-esteem as an employability skill**	**P**	**R**	**C**
B	01.03.01	Identify factors that affect self-esteem	P	R	
B	01.03.02	Compare effects of low self-esteem and high self-esteem	P	R	
B	01.03.03	Identify strategies to promote positive self-esteem	P	R	

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Code / Number		Unit/Competency/Builder	12	AD	AC
EC	**01.04.00**	**Demonstrate job retention skills**	**P**	**R**	**C**
B	01.04.01	Identify employer expectations regarding job performance, work habits, attitudes, personal appearance, and hygiene	P	R	
B	01.04.02	Exhibit appropriate work habits and attitude	P	R	
B	01.04.03	Demonstrate ability to set priorities	P	R	
B	01.04.04	Identify behaviors to establish successful working relationships	P	R	
B	01.04.05	Identify alternatives for dealing with harassment, bias, and discrimination based on race, color, national origin, sex, religion, handicap, or age	P	R	
B	01.04.06	Identify opportunities for advancement	P	R	
B	01.04.07	List reasons for termination	P	R	
B	01.04.08	List consequences of being absent frequently from job	P	R	
B	01.04.09	List consequences of frequently arriving late for work	P	R	
B	01.04.10	Demonstrate interpersonal relations skills (i.e., verbal and written)	P	R	
B	01.04.11	Demonstrate negotiation skills	P	R	
B	01.04.12	Demonstrate teamwork	P	R	
B	01.04.13	Follow chain-of-command	P	R	
B	01.04.14	Exhibit appropriate job dedication	P	R	

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Code / Number	Unit/Competency/Builder	12	AD	AC
EC 01.05.00	**Demonstrate knowledge of work ethic**	**P**	**R**	**C**
B 01.05.01	Define work ethic	P	R	
B 01.05.02	Identify factors that influence work ethic	P	R	
B 01.05.03	Differentiate between law and ethics	P	R	
B 01.05.04	Describe how personal values are reflected in work ethic	P	R	
B 01.05.05	Describe how interactions in the workplace affect personal work ethic	P	R	
B 01.05.06	Describe how life changes affect personal work ethic	P	R	

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Code / Number		Unit/Competency/Builder	12	AD	AC
EC	**01.06.00**	**Exhibit appropriate work ethic**	**P**	**R**	**C**
B	01.06.01	Use time-management techniques	P	R	
B	01.06.02	Avoid personal activity during work hours	P	R	
B	01.06.03	Attend work as scheduled	P	R	
B	01.06.04	Adhere to company and/or governmental policies, procedures, rules, and regulations	P	R	
B	01.06.05	Exercise confidentiality	P	R	
B	01.06.06	Demonstrate appropriate human relations skills	P	R	
B	01.06.07	Adhere to rules of conduct	P	R	
B	01.06.08	Accept constructive criticism	P	R	
B	01.06.09	Offer constructive criticism	P	R	
B	01.06.10	Take pride in work	P	R	
B	01.06.11	Resolve conflict	P	R	
B	01.06.12	Manage stress	P	R	
B	01.06.13	Avoid sexual connotations and harassment	P	R	
B	01.06.14	Adjust to changes in the workplace	P	R	
B	01.06.15	Demonstrate punctuality	P	R	
B	01.06.16	Assume responsibility for personal decisions and actions	P	R	
B	01.06.17	Take responsibility for assignments	P	R	
B	01.06.18	Follow chain-of-command	P	R	

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Code / Number	Unit/Competency/Builder	12	AD	AC
EC 01.07.00	**Apply decision-making techniques**	**P**	**R**	**CMS**
B 01.07.01	Identify decision to be made	P	R	
B 01.07.02	Identify ownership of decision to be made	P	R	
B 01.07.03	Identify possible alternatives and their consequences	P	R	
B 01.07.04	Make decisions based on facts, legality, ethics, goals, and/or corporate culture	P	R	
B 01.07.05	Apply time factor(s)	P	R	
B 01.07.06	Present decision to be implemented	P	R	
B 01.07.07	Evaluate decision made	P	R	
B 01.07.08	Take responsibility for decision	P	R	
EC 01.08.00	**Apply problem-solving techniques**	**P**	**R**	**CMS**
B 01.08.01	Identify problem	P	R	
B 01.08.02	Select appropriate problem solving tools/techniques	P	R	
B 01.08.03	Identify root problem cause(s)	P	R	
B 01.08.04	Track root problem cause(s)	P	R	
B 01.08.05	Identify possible solutions and their consequences (e.g., long term, short term, crisis)	P	R	
B 01.08.06	Use resources to explore possible solutions to problem	P	R	
B 01.08.07	Contrast advantages and disadvantages of each solution	P	R	
B 01.08.08	Identify appropriate action	P	R	
B 01.08.09	Evaluate results	P	R	
B 01.08.10	Identify post-preventive action	P	R	

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Code / Number		Unit/Competency/Builder	12	AD	AC
EC	**01.09.00**	**Exhibit characteristics for job advancement**	**P**	**R**	**C**
B	01.09.01	Display positive attitude	P	R	
B	01.09.02	Demonstrate knowledge of position	P	R	
B	01.09.03	Perform quality work	P	R	
B	01.09.04	Adapt to changing situations and technology	P	R	
B	01.09.05	Demonstrate capability/responsibility for different positions	P	R	
B	01.09.06	Identify characteristics of effective leaders	P	R	
B	01.09.07	Identify opportunities for leadership in work place/community	P	R	
B	01.09.08	Demonstrate initiative to affect change in workplace	P	R	
B	01.09.09	Participate in continuing education/training program	P	R	
B	01.09.10	Respond appropriately to criticism from employer, supervisor, or other employees	P	R	
B	01.09.11	Exhibit awareness of corporate culture	P	R	
B	01.09.12	Prepare for job setbacks	P	R	
B	01.09.13	Exhibit continual growth based on performance evaluation	P	R	
B	01.09.14	Set realistic goals	P	R	

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Code / Number	Unit/Competency/Builder	12	AD	AC

U 02.00.00 Professionalism

			P	R	CMS
EC	**02.01.00**	**Project professional image**			
B	02.01.01	Define professionalism	P	R	
B	02.01.02	Exhibit professional appearance	P	R	
B	02.01.03	Exhibit professional manners	P	R	
B	02.01.04	Project professional attitude	P	R	
B	02.01.05	Identify individuals' vital role in organization	P	R	
B	02.01.06	Exhibit proper etiquette in professionally-related situations	P	R	
EC	**02.02.00**	**Formulate individual and professional goals**	**P**	**R**	**CMS**
B	02.02.01	Set flexible, realistic, and measurable goals	P	R	
B	02.02.02	Identify potential barriers to achieving goals	P	R	
B	02.02.03	Identify strategies for addressing barriers to goal achievement	P	R	
B	02.02.04	Breakdown long-term goals into short-term goals	P	R	
B	02.02.05	Prioritize goals	P	R	
B	02.02.06	Commit to goals	P	R	
B	02.02.07	Adjust goals	P	R	
B	02.02.08	Obtain support for goals	P	R	
B	02.02.09	Reward goals achievement	P	R	
EC	**02.03.00**	**Support community well-being**	**P**	**R**	**CMS**
B	02.03.01	Identify environmental, educational, and social issues	P	R	
B	02.03.02	Participate in social and/or community activities	P	R	

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EC	**02.04.00**	**Contribute to organizational goals**	**I**	**P**	**CMS**
B	02.04.01	Evaluate personal goals in relation to organizational goals	I	P	
B	02.04.02	Monitor progress by evaluating feedback	I	P	
B	02.04.03	List responsibilities in relation to organizational goals	I	P	
B	02.04.04	Accomplish assigned tasks	I	P	
B	02.04.05	Exercise responsibility in relation to organizational goals	I	P	
B	02.04.06	Set appropriate personal performance standards	I	P	
B	02.04.07	Communicate goals with supervisor and peers	I	P	
B	02.04.08	Demonstrate knowledge of products and services	I	P	
B	02.04.09	Promote organizational image and mission	I	P	
EC	**02.05.00**	**Demonstrate positive relations in the workplace**	**I**	**P**	**CMS**
B	02.05.01	Identify personality types of self and others	I	P	
B	02.05.02	Identify various management styles	I	P	
B	02.05.03	Support employer expectations	I	P	
B	02.05.04	Support employer decisions	I	P	
B	02.05.05	Accept constructive criticism	I	P	
B	02.05.06	Give constructive feedback	I	P	
B	02.05.07	Adapt to changes in work place	I	P	
B	02.05.08	List factors to consider before resigning	I	P	
B	02.05.09	Write letter of resignation	I	P	

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EC	**02.06.00**	**Analyze effects of family on work and work on family**	**P**		**CMS**
B	02.06.01	Identify how family values, goals, and priorities are reflected in work place	P		
B	02.06.02	Identify responsibilities and rewards associated with paid and non-paid work	P		
B	02.06.03	Identify responsibilities and rewards associated with families	P		
B	02.06.04	Explain how family responsibilities can conflict with work	P		
B	02.06.05	Explain how work can conflict with family responsibilities	P		
B	02.06.06	Explain how work-related stress can affect families	P		
B	02.06.07	Explain how family-related stress can affect work	P		
B	02.06.08	Identify family support systems and resources	P		
B	02.06.09	Identify work-related support systems and resources	P		
B	02.06.10	Communicate with family regarding work	P		
EC	**02.07.00**	**Apply lifelong learning skills**	**I**	**P**	**C**
B	02.07.01	Define lifelong learning	I	P	
B	02.07.02	Identify factors that cause need for lifelong learning	I	P	
B	02.07.03	Analyze effects of change	I	P	
B	02.07.04	Identify reasons why goals change	I	P	
B	02.07.05	Describe importance of flexibility and adaptability	I	P	
B	02.07.06	Evaluate need for continuing education/training	I	P	

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Code / Number		Unit/Competency/Builder	12	AD	AC
EC	**02.08.00**	**Manage professional development**	**I**	**P**	**C**
B	02.08.01	Identify career opportunities	I	P	
B	02.08.02	Modify career plan	I	P	
B	02.08.03	Participate in continuing education/training opportunities	I	P	
B	02.08.04	Document continuing education/training	I	P	
B	02.08.05	Read profession-related manuals, technical journals, and periodicals	I	P	
B	02.08.06	Participate in professional organizations	I	P	
B	02.08.07	Build personal/professional mentor relationship	I	P	
B	02.08.08	Build personal/professional support system	I	P	
B	02.08.09	Build professional network	I	P	
B	02.08.10	Strengthen communication skills	I	P	
B	02.08.11	Strengthen leadership skills	I	P	
B	02.08.12	Strengthen management skills	I	P	

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Code / Number	Unit/Competency/Builder	12	AD	AC
U 03.00.00	**Teamwork**			
EC 03.01.00	**Demonstrate knowledge of teamwork**	**P**		**C**
B 03.01.01	Define employee empowerment	P		
B 03.01.02	Differentiate work groups and teams	P		
B 03.01.03	Identify conditions essential to teamwork (e.g., brainstorming)	P		
B 03.01.04	Explain influence of culture (e.g., corporate, community) on teamwork	P		
B 03.01.05	Identify appropriate situations for using teams	P		
B 03.01.06	Define team structures (e.g., cross functional, quality improvement, task force, quality circles)	P		
B 03.01.07	Identify team building concepts	P		
B 03.01.08	Describe characteristics and dynamics of teams	P		
B 03.01.09	Identify characteristics of effective team leaders and members	P		
B 03.01.10	Identify responsibilities of a valuable team member	P		
B 03.01.11	Identify methods of involving each member of a team	P		
B 03.01.12	Explain how individuals from various backgrounds contribute to work-related situations (e.g., technical training, cultural heritage)	P		
B 03.01.13	Explain the purpose of facilitators	P		
B 03.01.14	Define consensus	P		
B 03.01.15	Define reward/recognition system	P		

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Code / Number		Unit/Competency/Builder	12	AD	AC
EC	**03.02.00**	**Demonstrate teamwork**	**I**	**P**	**C**
B	03.02.01	Identify purpose of team and intended goal (include time frames)	I	P	
B	03.02.02	Structure team around purpose	I	P	
B	03.02.03	Define responsibilities of team members	I	P	
B	03.02.04	Contribute to efficiency and success of team	I	P	
B	03.02.05	Work toward individual and team milestones	I	P	
B	03.02.06	Analyze results of team project	I	P	
B	03.02.07	Facilitate a team meeting	I	P	
B	03.02.08	Assist team member(s) with problem	I	P	
B	03.02.09	Monitor time frame	I	P	
B	03.02.10	Stress continuous improvement	I	P	
B	03.02.11	Accept failure as part of learning	I	P	
EC	**03.03.00**	**Use teamwork to solve problems**	**I**	**P**	**CMS**
B	03.03.01	Identify appropriate situations for using teams	I	P	
B	03.03.02	Use problem-solving process in a team setting	I	P	
B	03.03.03	Identify quality management processes/techniques	I	P	
B	03.03.04	Identify quality assurance processes/techniques	I	P	
B	03.03.05	Prepare presentation	I	P	

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EC	**03.04.00**	**Conduct team meetings**	**I**	**P**	**C**
B	03.04.01	Plan agenda	I	P	
B	03.04.02	Schedule meeting and location	I	P	
B	03.04.03	Invite appropriate personnel	I	P	
B	03.04.04	Solicit outside speakers as needed	I	P	
B	03.04.05	Assign someone to take minutes	I	P	
B	03.04.06	Facilitate introductions	I	P	
B	03.04.07	Invite questions and comments and group participation	I	P	
B	03.04.08	Focus team on agenda items	I	P	
B	03.04.09	Assign appropriate action, time frame and accountability to tasks	I	P	
B	03.04.10	Monitor time	I	P	
B	03.04.11	Close meeting on time	I	P	
B	03.04.12	Publish minutes in timely manner	I	P	
B	03.04.13	Set ground rules	I	P	
B	03.04.14	Avoid placing individual agendas above the group's agenda	I	P	

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U 04.00.00	**Professional Practices**			
EC 04.01.00	**Explain professional responsibilities**	**P**	**R**	**CMS**
B 04.01.01	Explain the need for professional and ethical standards	P	R	
B 04.01.02	Explain responsibility of the individual to apply ethical standards	P	R	
B 04.01.03	Identify responsibility to client(s) and employer(s)	P	R	
B 04.01.04	Explain consequences of unprofessional and/or unethical behavior	P	R	
B 04.01.05	Explain importance of conflict resolution in the workplace	P	R	
EC 04.02.00	**Identify legal and ethical behavior**	**I**	**P**	**CMS**
B 04.02.01	Differentiate between legal and ethical behavior	I	P	
B 04.02.02	Explain terms, principles, and characteristics of legal and ethical behavior (e.g., loyalty, discretion, solicitation, competitor, supplier)	I	P	
B 04.02.03	Explain legal ramifications of breaching rules and regulations	I	P	
B 04.02.04	Explain effects of unethical and/or unlawful behavior	I	P	
B 04.02.05	Practice within scope of the profession		P	

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Code / Number	Unit/Competency/Builder	12	AD	AC
EC 04.03.00	**Function as a self-managed employee**	**I**	**P**	**CM**
B 04.03.01	Propose project		P	
B 04.03.02	Organize tasks	I	P	
B 04.03.03	Manage time	I	P	
B 04.03.04	Meet deadlines	I	P	
B 04.03.05	Maintain business records		P	
B 04.03.06	Make long-term and short-term plans		P	
B 04.03.07	Evaluate progress	I	P	
B 04.03.08	Report progress		P	
B 04.03.09	Delegate project		P	
EC 04.04.00	**Follow intellectual property rights and copyright laws**	**I**	**P**	**C**
B 04.04.01	Explain purpose of patent	I	P	
B 04.04.02	Explain purpose of copyright	I	P	
B 04.04.03	Explain purpose of licenses	I	P	
B 04.04.04	Explain purpose of trademarks	I	P	
B 04.04.05	Explain rights of the originator		P	
B 04.04.06	Explain rights of the public		P	
B 04.04.07	Define confidentiality	I	P	
B 04.04.08	Define proprietary	I	P	
B 04.04.09	Explain legal ownership of proprietary material		P	
B 04.04.10	Describe stock image/text usage rights		P	
B 04.04.11	Explain reproduction licensing and residual usage		P	

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U 05.00.00	**Workplace Safety**			
EC 05.01.00	**Maintain safe working environment**	**P**	**R**	**CMS**
B 05.01.01	Identify visual controls (e.g., monitors, read outs	P	R	
B 05.01.02	Identify auditory controls	P	R	
B 05.01.03	Describe what an MSDS sheet is	P	R	
B 05.01.04	Comply with HMIS material safety data sheets (MSDS) and OSHA regulations	P	R	
B 05.01.05	Comply with all MSDS regulations regarding hazardous materials	P	R	
B 05.01.06	Comply with regulatory guidelines in handling, labeling, and disposal of solutions (e.g., fountain chemicals, inks, wash-up solutions, drum grounding)	P	R	
B 05.01.07	Use personal protective wear and equipment	P	R	
B 05.01.08	Apply workplace safety rules and procedures	P	R	
B 05.01.09	Apply personal safety rules and procedures	P	R	
B 05.01.10	Maintain clean work area by removing waste, keeping alleyways clear, cleaning tools, and preventing spills	P	R	
B 05.01.11	Apply applicable electrical, mechanical, steam, hydraulic and pneumatic safety rules and procedures	P	R	
B 05.01.12	Apply fire safety rules and procedures	P	R	
B 05.01.13	Perform lockout and tagout	P	R	
B 05.01.14	Identify location of control panels, shut-off valves, and fire extinguishers	P	R	
B 05.01.15	Recycle scrap metal, chips, shavings, coolants, solvents, trash, and waste materials	P	R	
B 05.01.16	Use preventive maintenance checklists	P	R	
B 05.01.17	Explain basic philosophy of "right to know" legislation	P	R	

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RC	**05.02.00**	**Demonstrate knowledge of ergonomics**	**I**	**R**	**CMS**
B	05.02.01	Define ergonomics	I	R	
B	05.02.02	Minimize mechanical stresses (e.g., sharp edges, heat, cold, hard surfaces, weights, vibration)	I	R	
B	05.02.03	Minimize awkward body positions	I	R	
B	05.02.04	Explain need for appropriate working heights of chairs, stools, workbenches, equipment	I	R	
B	05.02.05	Explain need for adequate lighting	I	R	

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U 06.00.00	**Project Management**			
EC 06.01.00	**Explain project management**	**I**	**P**	**C**
B 06.01.01	Identify project purpose/goal	I	P	
B 06.01.02	Identify project objectives	I	P	
B 06.01.03	Identify work breakdown structure (WBS)		P	
B 06.01.04	Identify resource requirements	I	P	
B 06.01.05	Identify project economics/funding/return on investment		P	
B 06.01.06	Identify risks		P	
B 06.01.07	Explain Critical Path Method (CPM)		P	
EC 06.02.00	**Implement projects**	**I**	**P**	**CMS**
B 06.02.01	Monitor project	I	P	
B 06.02.02	Control project	I	P	
B 06.02.03	Modify project		P	
EC 06.03.00	**Evaluate projects**	**I**	**P**	**CMS**
B 06.03.01	Analyze performance	I	P	
B 06.03.02	Perform critical review of project	I	P	
B 06.03.03	Draw project management conclusions	I	P	
RC 06.04.00	**Write project summary**	**I**	**P**	**C**
B 06.04.01	List project goals	I	P	
B 06.04.02	Document project's key successes	I	P	
B 06.04.03	Document project's key failures	I	P	
B 06.04.04	Analyze costs vs accomplishments		P	

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U 07.00.00	**Problem Analysis**			
EC 07.01.00	**Appraise situations**	**P**	**R**	**CMS**
B 07.01.01	Identify concerns	P	R	
B 07.01.02	Set priorities	P	R	
B 07.01.03	Identify resolution process	P	R	
B 07.01.04	Plan resolution	P	R	
RC 07.02.00	**Analyze problems**	**I**	**P**	**CMS**
B 07.02.01	Identify potential problems	I	P	
B 07.02.02	Identify likely causes	I	P	
B 07.02.03	Test for probable causes		P	
B 07.02.04	Verify cause		P	
B 07.02.05	Identify preventive actions		P	
B 07.02.06	Identify contingent actions		P	
RC 07.03.00	**Analyze decisions**	**I**	**P**	**CMS**
B 07.03.01	Identify objective(s)	I	P	
B 07.03.02	Identify alternatives	I	P	
B 07.03.03	Evaluate alternatives	I	P	
B 07.03.04	Assess risks		P	
B 07.03.05	Make final choice	I	P	
B 07.03.06	Determine effectiveness of decision	I	P	
B 07.03.07	Document results		P	

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U 08.00.00	**General Administrative Functions**			
EC 08.01.00	**Maintain work flow**	**P**	**R**	**CMS**
B 08.01.01	Organize work	P	R	
B 08.01.02	Prioritize work	P	R	
B 08.01.03	Apply time-management techniques	P	R	
B 08.01.04	Complete assigned tasks in a timely manner	P	R	
B 08.01.05	Coordinate with team members	P	R	
RC 08.02.00	**Perform telecommunications operations**	**P**	**R**	**C**
B 08.02.01	Display telephone etiquette	P	R	
B 08.02.02	Operate equipment	P	R	
B 08.02.03	Listen assertively	P	R	
B 08.02.04	Verify information	P	R	
B 08.02.05	Record messages	P	R	
B 08.02.06	Place calls	P	R	
B 08.02.07	Organize teleconferences	P	R	
B 08.02.08	Use voice mail/messaging systems	P	R	
B 08.02.09	Operate fax/modem machine	P	R	
B 08.02.10	Use e-mail systems	P	R	
B 08.02.11	Use Internet communications services	P	R	

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EC	**08.03.00**	**Manage records**	**I**	**P**	**C**
B	08.03.01	Implement filing system	I	P	
B	08.03.02	Implement retention system		P	
B	08.03.03	Perform electronic filing operations	I	P	
B	08.03.04	Maintain inventory records		P	
B	08.03.05	Retrieve files	I	P	

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U 09.00.00	**Economic and Business Principles**			
RC 09.01.00	**Describe basic economic concepts**	**I**	**P**	**CM**
B 09.01.01	Identify importance of economic resources	I	P	
B 09.01.02	Explain concept of economic resources		P	
B 09.01.03	Explain importance of economic resources		P	
B 09.01.04	Explain concept of economic goods and services		P	
B 09.01.05	Differentiate between economic goods and services		P	
B 09.01.06	Differentiate between needs and wants	I	P	
B 09.01.07	Explain concept of supply and demand	I	P	
B 09.01.08	Explain concept of price	I	P	
B 09.01.09	Explain how supply, demand, and price are related	I	P	
B 09.01.10	Explain concept of private enterprise and business ownership		P	
B 09.01.11	Explain concept of profit		P	
B 09.01.12	Explain concept of risk		P	
B 09.01.13	Explain concept of competition		P	
B 09.01.14	Explain relationship among risk, competition, and profit		P	
B 09.01.15	Describe global economic and world markets		P	
B 09.01.16	Describe economic cycles (e.g., unemployment, recession, inflation, budget deficits)		P	
B 09.01.17	Describe economic arena's effect on business (e.g., financial, competitor indicators, industry)		P	

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RC 09.02.00	**Describe economic systems**	**I**	**R**	**C**
B 09.02.01	Describe free enterprise system	I	R	
B 09.02.02	Describe relationship between government and business		I	
B 09.02.03	Describe relationship between labor and management	I	R	
B 09.02.04	Describe the concept of organized labor	I	R	
B 09.02.05	Compare types of economic systems		I	
RC 09.03.00	**Explain basic business concepts**	**I**	**R**	**CM**
B 09.03.01	Identify functions of business	I	R	
B 09.03.02	Explain role of management	I	R	
B 09.03.03	Explain role of labor	I	R	
B 09.03.04	Explain concept of service as a product	I	R	
B 09.03.05	Explain role of administration	I	R	
B 09.03.06	Explain role of operations	I	R	
B 09.03.07	Identify role of company objectives	I	R	
B 09.03.08	Identify importance of ethical business practices	I	R	
B 09.03.09	Identify types of ownership	I	R	
B 09.03.10	Identify components of a business plan	I	R	

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EC	**09.04.00**	**Explain legal concepts**	**I**	**P**	**C**
B	09.04.01	Define legal terminology		P	
B	09.04.02	Explain business law concepts		P	
B	09.04.03	Identify contracts and/or legal documents		P	
B	09.04.04	Explain relationship of laws and regulations to company contracts, policies, and procedures		P	
B	09.04.05	Identify laws relating to working conditions, wages and hours, civil rights, social security, disability, unemployment insurance, and exempt vs. nonexempt	I	P	
B	09.04.06	Explain collective bargaining agreement	I	P	

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Code / Number	Unit/Competency/Builder	12	AD	AC
U 10.00.00	**Basic Computer Concepts and Applications**			
EC 10.01.00	**Describe personal computer operations**	**P**	**R**	**CS**
B 10.01.01	Explain how data is stored in main computer memory	P	R	
B 10.01.02	Explain how computer system executes program instruction	P	R	
B 10.01.03	Explain computer storage capacity	P	R	
B 10.01.04	Explain how data is represented	P	R	
B 10.01.05	Describe data storage techniques	P	R	
B 10.01.06	Identify types of memory	P	R	
EC 10.02.00	**Demonstrate basic computer literacy**	**P**	**R**	
B 10.02.01	Create ASCII text files with a text editor	P	R	
B 10.02.02	Explain rules for naming files and directories	P	R	
B 10.02.03	Manage files	P	R	
B 10.02.04	Create directories	P	R	
B 10.02.05	Remove directories	P	R	
B 10.02.06	Change directories	P	R	
B 10.02.07	Manipulate files	P	R	
B 10.02.08	Format diskettes	P	R	
B 10.02.09	Label diskettes	P	R	
B 10.02.10	Explain the syntax of operating system commands	P	R	
B 10.02.11	Use wildcards in operating system commands	P	R	

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EC 10.03.00	**Explain information processing cycle**	**P**	**R**	**C**
B 10.03.01	Describe computer languages and their use	P	R	
B 10.03.02	Describe difference between data files and program files	P	R	
B 10.03.03	Identify PC hardware	P	R	
B 10.03.04	Explain Internet	P	R	
B 10.03.05	Explain PC network layout	P	R	
B 10.03.06	Explain mini/mainframe network layout	P	R	
B 10.03.07	Differentiate hardware and software	P	R	
B 10.03.08	Differentiate open from proprietary architecture	P	R	
RC 10.04.00	**Explain operating systems**	**I**	**P**	**C**
B 10.04.01	Identify operating systems and their attributes (e.g., DOS, Unix, Macintosh, Windows)	I	P	
B 10.04.02	Describe compatibility issues	I	P	
B 10.04.03	Identify cross-platform file conversion tools	I	P	
B 10.04.04	Describe how commands handle tasks in operating systems	I	P	
B 10.04.05	Describe various input/output systems	I	P	
B 10.04.06	Describe the purpose of operating system utilities	I	P	
B 10.04.07	Differentiate between a compiler and an interpreter	I	P	
EC 10.05.00	**Operate computer hardware**	**P**	**R**	**C**
B 10.05.01	Practice proper media handling techniques (e.g., magnetic fields, dust, liquids)	P	R	
B 10.05.02	Use hardware (e.g, mouse, diskettes, drive, modems, touch screen, printers, digitizers, scanners, cables, protection devices	P	R	
B 10.05.03	Demonstrate basic care of hardware	P	R	

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Code / Number		Unit/Competency/Builder	12	AD	AC
EC	**10.06.00**	**Explain operation of peripheral devices**	**P**	**R**	**C**
B	10.06.01	Identify peripherals and operating requirements of each	P	R	
B	10.06.02	Identify primary devices used for personal computer auxiliary storage	P	R	
B	10.06.03	Describe how data is stored on diskettes and hard drives	P	R	
B	10.06.04	List speed and storage capacities of computer auxiliary storage devices	P	R	
B	10.06.05	Describe attributes of diskettes and hard disks regarding speed and storage capacity	P	R	
B	10.06.06	List types of disk storage used with large computer systems	P	R	
B	10.06.07	Define role of tape storage in relation to personal and large computers	P	R	
B	10.06.08	Describe security issues related to peripheral devices	P	R	
B	10.06.09	Explain purpose of input devices (e.g., keyboard, mouse, scanners, pens, bar code readers, credit/debit/smart cards, voice, video, gloves)	P	R	
B	10.06.10	Describe operation of output devices (e.g., voice, speaker output devices, printers, plotters, printer sharing units, SCSI interface, video display)	P	R	
B	10.06.11	Describe operation of multimedia (e.g., video, audiosound)	P	R	
B	10.06.12	Describe operation of storage devices (e.g., tape, disk, CD-ROM)	P	R	

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Code / Number		Unit/Competency/Builder	12	AD	AC
EC	**10.07.00**	**Operate peripheral devices**	**P**	**R**	
B	10.07.01	Use appropriate reference materials	P	R	
B	10.07.02	Load media devices	P	R	
B	10.07.03	Start media devices	P	R	
B	10.07.04	Unload media devices	P	R	
B	10.07.05	Import, edit, and export video and audio	P	R	
B	10.07.06	Set up print devices	P	R	
B	10.07.07	Operate scanner devices	P	R	
B	10.07.08	Operate print devices	P	R	
B	10.07.09	Maintain print devices	P	R	
B	10.07.10	Monitor peripheral equipment operations	P	R	
B	10.07.11	Perform routine maintenance on peripheral devices	P	R	
B	10.07.12	List appropriate control procedures	P	R	
B	10.07.13	Transmit via modem	P	R	
B	10.07.14	Receive via modem	P	R	
B	10.07.15	Search a CD-ROM library	P	R	
B	10.07.16	Print information from a CD-ROM library	P	R	
B	10.07.17	Describe device driver	P	R	
EC	**10.08.00**	**Store media**	**I**	**P**	
B	10.08.01	Identify need for data library		P	
B	10.08.02	Retrieve stored media (e.g., on-line, off-line, permanent, off-site)	I	P	
B	10.08.03	File stored media (e.g., on-line, off-line, permanent, off-site)	I	P	
B	10.08.04	Initialize media		P	
B	10.08.05	Catalog media		P	

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Code / Number		Unit/Competency/Builder	12	AD	AC
EC	**10.09.00**	**Explain software applications**	**P**	**R**	**C**
B	10.09.01	Define software types and functions	P	R	
B	10.09.02	Describe need for application software	P	R	
B	10.09.03	Describe different types of software applications	P	R	
B	10.09.04	Explain advantages and disadvantages of integrated and dedicated software	P	R	
B	10.09.05	Differentiate features between like applications	P	R	
B	10.09.06	List software sources	P	R	
B	10.09.07	Explain software copyright laws	P	R	
B	10.09.08	Explain data compression techniques	P	R	
B	10.09.09	Explain use of passwords/security	P	R	
B	10.09.10	Explain desktop productivity tools	P	R	

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Code / Number		Unit/Competency/Builder	12	AD	AC
EC	**10.10.00**	**Use word processing packages**	**P**	**R**	**C**
B	10.10.01	Define word processing terminology	P	R	
B	10.10.02	Explain functions of word processing software	P	R	
B	10.10.03	Explain word processing applications	P	R	
B	10.10.04	Use appropriate reference materials including on-line help	P	R	
B	10.10.05	Update spelling dictionary and spell check	P	R	
B	10.10.06	Perform document functions (e.g., locate, rename, delete, save, retrieve, copy)	P	R	
B	10.10.07	Perform formatting functions (e.g., center, underline, bold, cut and paste)	P	R	
B	10.10.08	Perform redlining functions	P	R	
B	10.10.09	Use edit features	P	R	
B	10.10.10	Use sort features	P	R	
B	10.10.11	Add page numbers to document	P	R	
B	10.10.12	Add headers and footers	P	R	
B	10.10.13	Print files, pages, screens and blocks of text	P	R	
B	10.10.14	Verify accuracy of output	P	R	
B	10.10.15	Create a document	P	R	
B	10.10.16	Save a document to disk	P	R	
B	10.10.17	Retrieve a document from disk	P	R	
B	10.10.18	Edit an existing document	P	R	
B	10.10.19	Describe word-wrap	P	R	
B	10.10.20	Print a document	P	R	
B	10.10.21	Store boilerplate material (e.g., templates, stationary files)	P	R	
B	10.10.22	Compose documents at keyboard	P	R	
B	10.10.23	Tabulate multiple columns	P	R	

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Code / Number		Unit/Competency/Builder	12	AD	AC
B	10.10.24	Prepare new documents from existing ones	P	R	
B	10.10.25	Merge selected copy with new information	P	R	
B	10.10.26	Prepare various types of table options	P	R	
B	10.10.27	Format text	P	R	
B	10.10.28	Integrate database, spreadsheet and graphic files	P	R	
B	10.10.29	Convert documents from one system/version to another	P	R	
B	10.10.30	Demonstrate use of computer thesaurus	P	R	
B	10.10.31	Use multimedia techniques/resources	P	R	
B	10.10.32	Perform merge functions	P	R	

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Code / Number	Unit/Competency/Builder	12	AD	AC
EC 10.11.00	**Use spreadsheet packages**	**P**	**R**	**S**
B 10.11.01	Define spreadsheet	P	R	
B 10.11.02	Explain basic spreadsheet terminology	P	R	
B 10.11.03	Define components of spreadsheets	P	R	
B 10.11.04	Describe implementation of spreadsheet operations in business scope	P	R	
B 10.11.05	Use spell check	P	R	
B 10.11.06	Execute an electronic spreadsheet	P	R	
B 10.11.07	Enter data, formulas, and functions	P	R	
B 10.11.08	Differentiate between labels and numbers	P	R	
B 10.11.09	Speculate using "what if..." questions	P	R	
B 10.11.10	Sequence keystrokes in the creation of a macro	P	R	
B 10.11.11	Create database within spreadsheet	P	R	
B 10.11.12	Perform data query functions	P	R	
B 10.11.13	Move around in spreadsheet and correct errors	P	R	
B 10.11.14	Create links to other files	P	R	
B 10.11.15	Format spreadsheet	P	R	
B 10.11.16	Create graphs	P	R	
B 10.11.17	Print graphs	P	R	
B 10.11.18	Save previously saved files	P	R	
B 10.11.19	Load previously saved files	P	R	
B 10.11.20	Replicate cells using copy commands	P	R	
B 10.11.21	Use electronic spreadsheet to complete business application	P	R	
B 10.11.22	Use spreadsheet to plan financial strategies	P	R	
B 10.11.23	Prepare spreadsheet	P	R	
B 10.11.24	Use multimedia techniques/resources	P	R	

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Code / Number		Unit/Competency/Builder	12	AD	AC
EC	**10.12.00**	**Use databases**	**P**	**R**	**CM**
B	10.12.01	Define database	P	R	
B	10.12.02	Explain terms used in database systems	P	R	
B	10.12.03	Describe common functions of database systems	P	R	
B	10.12.04	Use database to design, create, input, edit, and display fields and records	P	R	
B	10.12.05	Analyze structure of database files	P	R	
B	10.12.06	Perform calculations with a database file	P	R	
B	10.12.07	Sort records based on multiple fields	P	R	
B	10.12.08	Identify advanced database technology	P	R	
B	10.12.09	Use appropriate reference materials	P	R	
B	10.12.10	Utilize relational database	P	R	
B	10.12.11	Enter elements into database	P	R	
B	10.12.12	Proofread database	P	R	
B	10.12.13	Explain database	P	R	
B	10.12.14	Print reports using data from multiple databases	P	R	
B	10.12.15	Use database files with other application software	P	R	
B	10.12.16	Verify accuracy of output (e.g., edit reports)	P	R	
B	10.12.17	Query databases	P	R	
EC	**10.13.00**	**Use graphic user interface (GUI) techniques**	**I**	**P**	
B	10.13.01	Describe a variety of computer interfaces	I	P	
B	10.13.02	Explain multi-tasking environment	I	P	
B	10.13.03	Use general navigational skills	I	P	
B	10.13.04	Use cut and paste functions	I	P	

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Code / Number		Unit/Competency/Builder	12	AD	AC
EC	**10.14.00**	**Manage software packages**	**I**	**P**	
B	10.14.01	Install software packages	I	P	
B	10.14.02	Upgrade software packages	I	P	
B	10.14.03	Document installation and upgrade of software packages		P	
B	10.14.04	Apply security levels/procedures to sensitive data		P	
B	10.14.05	Manage software preferences		P	
B	10.14.06	Manage software conflicts	I	P	
B	10.14.07	Identify system requirements	I	P	
B	10.14.08	Identify licensing issues		P	
EC	**10.15.00**	**Maintain computer security requirements**	**I**	**P**	
B	10.15.01	Apply business ethics	I	P	
B	10.15.02	Follow security rules, regulations, and codes	I	P	
B	10.15.03	Implement security procedures		P	
B	10.15.04	Document security procedures		P	

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EC	**10.16.00**	**Maintain personal computer systems**	**I**	**P**	
B	10.16.01	Monitor system status and performance	I	P	
B	10.16.02	Run diagnostics, utilities, and anti virus	I	P	
B	10.16.03	Report computer system malfunction(s)	I	P	
B	10.16.04	Report software malfunction(s)	I	P	
B	10.16.05	Identify corrupted files and recovery procedures		P	
B	10.16.06	Maintain security		P	
B	10.16.07	Maintain hardware/software inventory		P	
B	10.16.08	Perform backup procedure(s)		P	
B	10.16.09	Perform preventive maintenance	I	P	
B	10.16.10	Demonstrate file management techniques		P	
B	10.16.11	Follow log-off and power-down procedure(s)		P	
B	10.16.12	Follow equipment maintenance procedures	I	P	
RC	**10.17.00**	**Demonstrate basic knowledge of networks**	**I**	**I**	**C**
B	10.17.01	Explain communications standards	I	R	
B	10.17.02	Describe network structures	I	R	
B	10.17.03	Explain network types and protocols		I	
B	10.17.04	Explain network connectivity		I	
B	10.17.05	Describe various network operating systems		I	
B	10.17.06	Explain the difference between network software and individual use software		I	
B	10.17.07	Use a network to access, file, and store files		I	

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Code / Number		Unit/Competency/Builder	12	AD	AC
EC	**10.18.00**	**Use a shared environment**	**P**	**R**	**C**
B	10.18.01	List purposes of a network environment	P	R	
B	10.18.02	Define electronic mail	P	R	
B	10.18.03	Identify advantages and disadvantages of electronic mail	P	R	
B	10.18.04	Describe impact of local & wide area networks on mail delivery	P	R	
B	10.18.05	Compose electronic messages	P	R	
B	10.18.06	Send electronic messages using appropriate format	P	R	
B	10.18.07	List categories of electronic mail service	P	R	
B	10.18.08	Transmit document using electronic mail system	P	R	
B	10.18.09	Use collaboration tools	P	R	
B	10.18.10	Monitor electronic mail	P	R	
B	10.18.11	Use networked environments	P	R	
B	10.18.12	Conduct literature searches using a variety of on-line tools	P	R	
B	10.18.13	Explain access, security, transmission and retrieval	P	R	

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EC	**10.19.00**	**Demonstrate knowledge of the Internet/Intranet**	**P**	**R**	**C**
B	10.19.01	Define the Internet/Intranet	P	R	
B	10.19.02	Explain how the Internet/Intranet works	P	R	
B	10.19.03	Explain Internet/Intranet capabilities and limitations	P	R	
B	10.19.04	Explain how to connect to the Internet/Intranet via modem, ISDN, etc.	P	R	
B	10.19.05	Install Internet/Intranet software	P	R	
B	10.19.06	Navigate the World Wide Web	P	R	
B	10.19.07	Identify services and tools offered on the Internet/Intranet	P	R	
B	10.19.08	Explain bookmarks	P	R	
B	10.19.09	Describe security issues	P	R	
B	10.19.10	Describe ethical use of the Internet/Intranet	P	R	
EC	**10.20.00**	**Use the Internet/Intranet**	**P**	**R**	**C**
B	10.20.01	Define how the Internet can be used for research	P	R	
B	10.20.02	Use services and tools offered on the Internet for research	P	R	
B	10.20.03	Identify search engines	P	R	
B	10.20.04	Use search engines	P	R	
B	10.20.05	Evaluate Internet resources and accuracy of information	P	R	
B	10.20.06	Access library catalogs on the Internet	P	R	
B	10.20.07	Access commercial and government resources	P	R	
B	10.20.08	Download files	P	R	
B	10.20.09	Use other Internet/Intranet tools and services	P	R	

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U 11.00.00	**Quality Assurance**			
EC 11.01.00	**Demonstrate knowledge of quality assurance**	**I**	**P**	**C**
B 11.01.01	Explain the ISO 9000 process	I	P	
B 11.01.02	Define quality terms	I	P	
B 11.01.03	Define quality functions	I	P	
B 11.01.04	Describe control devices used in functional areas (e.g., SPC, equipment)	I	P	
B 11.01.05	Explain importance of internal and external customers	I	P	
B 11.01.06	Identify internal and external customers	I	P	
B 11.01.07	Describe successful efforts by industry to improve quality and/or reduce costs	I	P	
B 11.01.08	Differentiate prevention and detection	I	P	
EC 11.02.00	**Demonstrate knowledge of engineering a quality product**	**I**	**P**	**CM**
B 11.02.01	Associate customer satisfaction with product characteristics (e.g., usefulness, price, operation, life, reliability, safety, cost of operation	I	P	
B 11.02.02	Define failure	I	P	
B 11.02.03	Explain the role of testing and reliability	I	P	
B 11.02.04	Define value engineering	I	P	
B 11.02.05	Define quality objectives	I	P	
B 11.02.06	Identify cost components as they relate to quality objectives	I	P	

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Code / Number		Unit/Competency/Builder	12	AD	AC
EC	**11.03.00**	**Demonstrate knowledge of quality cost implications**	**I**	**P**	**CM**
B	11.03.01	Identify cost/quality objectives	I	P	
B	11.03.02	Classify costs (i.e., direct and indirect, fixed and variable, methods and standards)	I	P	
B	11.03.03	Classify quality costs (i.e., prevention, evaluation, pre-delivery failure, post-delivery failure)	I	P	
B	11.03.04	Define product liability	I	P	
B	11.03.05	Explain consumerism and liability prevention	I	P	
B	11.03.06	Define safety terms of product	I	P	
B	11.03.07	Identify personal safety responsibility within organization	I	P	
B	11.03.08	Differentiate express and implied warranty	I	P	
EC	**11.04.00**	**Explain importance of interdepartmental relationships to quality assurance**	**I**	**P**	**C**
B	11.04.01	Explain need for everyone's commitment in assuring quality	I	P	
B	11.04.02	Explain phrase "Everyone is a customer/supplier"	I	P	
B	11.04.03	Define quality improvement team models	I	P	
B	11.04.04	Explain the importance of top management's support of quality	I	P	
B	11.04.05	Explain continuing improvement	I	P	

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Code / Number	Unit/Competency/Builder	12	AD	AC
EC 11.05.00	**Demonstrate knowledge of basic statistics**	**I**	**P**	**CM**
B 11.05.01	Describe data collection methods	I	P	
B 11.05.02	Collect data	I	P	
B 11.05.03	Organize data by flow chart		P	
B 11.05.04	Interpret data by cause and effect diagrams		P	
B 11.05.05	Define nominal, ordinal, interval, and ratio data		P	
B 11.05.06	Define mean, median, and mode	I	P	
B 11.05.07	Explain significance of standard deviation	I	P	
B 11.05.08	Explain normal distribution		P	
RC 11.06.00	**Use quality control charts**	**I**	**R**	**M**
B 11.06.01	Identify operational definitions for attribute criteria	I	R	
B 11.06.02	Interpret histogram	I	R	
B 11.06.03	Interpret scattergrams		I	
B 11.06.04	Interpret NP chart		I	
B 11.06.05	Interpret P chart		I	
B 11.06.06	Interpret flowchart	I	R	
B 11.06.07	Interpret cause-and-effect diagram		I	
RC 11.07.00	**Demonstrate knowledge of JIT**	**I**	**R**	**M**
B 11.07.01	Define just-in-time concept (JIT)	I	R	
B 11.07.02	Describe various production methodologies (e.g., standard cycle times, routings, standard quantities, multiple-machine tending)		I	
B 11.07.03	Describe types of inventory control (e.g., Kanban)	I	R	
B 11.07.04	Describe importance of flexibility	I	R	

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Code / Number		Unit/Competency/Builder	12	AD	AC
RC	**11.08.00**	**Demonstrate knowledge of inspection**	**I**	**R**	**CM**
B	11.08.01	Explain purpose of inspection	I	R	
B	11.08.02	Explain purpose of incoming, ongoing, and final inspections	I		
B	11.08.03	Define rework, salvage, and scrap	I		
B	11.08.04	Use checksheets to organize and record inspection results	I		

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Code / Number	Unit/Competency/Builder	12	AD	AC
U 12.00.00	**Technical Recording and Reporting**			
EC 12.01.00	**Demonstrate proficiency in technical recording**	**I**	**P**	**CMS**
B 12.01.01	Describe various documentation procedures	I	P	
B 12.01.02	Interpret specifications or drawings	I	P	
B 12.01.03	Ask open-ended questions	I	P	
B 12.01.04	Record process (e.g., flowchart, step-by-step)	I	P	
B 12.01.05	Identify parameters	I	P	
B 12.01.06	Record accurate, truthful data	I	P	
B 12.01.07	Maintain test logs	I	P	
B 12.01.08	Compile cumulative reference notebook/record	I	P	
B 12.01.09	Measure appropriate parameters	I	P	
B 12.01.10	Draft preventive maintenance and calibration procedures	I	P	

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Code / Number		Unit/Competency/Builder	12	AD	AC
EC	**12.02.00**	**Demonstrate proficiency in technical reporting**	**I**	**P**	**CMS**
B	12.02.01	Use data books and cross reference/technical manuals	I	P	
B	12.02.02	Compose technical memoranda	I	P	
B	12.02.03	Identify type of report or format needed	I	P	
B	12.02.04	Use appropriate format	I	P	
B	12.02.05	Compile relevant data	I	P	
B	12.02.06	Design charts and graphs	I	P	
B	12.02.07	Analyze data	I	P	
B	12.02.08	Draw conclusions	I	P	
B	12.02.09	Explain analytical methods used	I	P	
B	12.02.10	Outline reports	I	P	
B	12.02.11	Write reports	I	P	
B	12.02.12	Present reports	I	P	

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Code / Number		Unit/Competency/Builder	12	AD	AC
U	**13.00.00**	**Drafting Technology**			
EC	**13.01.00**	**Apply basic drafting skills**	**I**	**P**	**CM**
B	13.01.01	Use drafting equipment, measuring scales, drawing media, drafting instruments and consumable materials, blueprint machine	I	P	
B	13.01.02	Identify line styles, weights (alphabet of lines)		P	
B	13.01.03	Select proper drawing scale, introduction to different types	I	P	
B	13.01.04	Prepare title blocks and other drafting formats	I	P	
B	13.01.05	Apply freehand and other lettering techniques	I	P	
B	13.01.06	Prepare multi-view drawings		P	
B	13.01.07	Prepare multi-view sketches		P	
B	13.01.08	Prepare orthographic views		P	
B	13.01.09	Measure angles		P	
B	13.01.10	Draw horizontal, vertical, angular, parallel, and perpendicular lines		P	
B	13.01.11	Transfer an angle		P	
B	13.01.12	Construct tangent lines (to arcs) and tangent arcs (to arcs)		P	
B	13.01.13	Bisect angles and arcs		P	
B	13.01.14	Bisect lines		P	
B	13.01.15	Divide lines		P	
B	13.01.16	Construct three-point circle		P	
B	13.01.17	Construct regular hexagon, pentagon, and octagon		P	
B	13.01.18	Prepare single-view drawings		P	
B	13.01.19	Prepare dimension drawings		P	
B	13.01.20	Interpret notes and dimensions to determine part		P	
B	13.01.21	Draw arcs, circles, and conics		P	

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B	13.01.22	Transfer measurements		P	
EC	**13.02.00**	**Interpret basic prints**	**P**	**R**	**M**
B	13.02.01	Visualize object from drawing	P	R	
B	13.02.02	Interpret orthographic projections	P	R	
B	13.02.03	Interpret isometric views	P	R	
B	13.02.04	Interpret sectional views	P	R	
B	13.02.05	Interpret detail and assembly drawings	P	R	
B	13.02.06	Interpret dimensions	P	R	
B	13.02.07	Interpret tolerances	P	R	
EC	**13.03.00**	**Interpret intermediate prints**	**I**	**P**	**M**
B	13.03.01	Interpret screw thread specifications		P	
B	13.03.02	Interpret pneumatic/hydraulic drawings		P	
B	13.03.03	Interpret schematics	I	P	
B	13.03.04	Identify a bill of materials	I	P	
B	13.03.05	Interpret basic mechanical standards and symbols		P	
RC	**13.04.00**	**Convert dimensions and tolerances**	**I**	**R**	**M**
B	13.04.01	Convert dimensions and tolerances from English units to metric units	I	R	
B	13.04.02	Convert dimensions and tolerances from metric units to English units	I	R	

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Code / Number	Unit/Competency/Builder	12	AD	AC
U 14.00.00	**CADD Fundamentals (The Competencies in this Unit meet or exceed the applicable sections of the National Occupational Skill Standards developed by the National Coalition for Advanced Manufacturing (NACFAM). Sources - CADD - Computer Aided Drafting &**			
EC 14.01.00	**Demonstrate basic use of computer operating system**	**P**	**R**	**C**
B 14.01.01	Explain rules for naming files and directories	P	R	
B 14.01.02	Manage files	P	R	
B 14.01.03	Create directories/subdirectories	P	R	
B 14.01.04	Remove directories/subdirectories	P	R	
B 14.01.05	Change directories/subdirectories	P	R	
B 14.01.06	Copy files	P	R	
B 14.01.07	Rename files	P	R	
B 14.01.08	Erase files	P	R	
B 14.01.09	Format diskettes	P	R	
B 14.01.10	Label diskettes	P	R	
B 14.01.11	Explain the syntax of operating system commands	P	R	
B 14.01.12	Use wildcards in operating system commands	P	R	

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Code / Number	Unit/Competency/Builder	12	AD	AC
EC 14.02.00	**Operate a CADD system**	**P**	**R**	**CM**
B 14.02.01	Use keyboard input	P	R	
B 14.02.02	Use screen and tablet menus	P	R	
B 14.02.03	Use other input devices (e.g., scanner, mouse)	P	R	
B 14.02.04	Create scaled plots	P	R	
B 14.02.05	Operate a printer/plotter (e.g., laser plotter)	P	R	
B 14.02.06	Access on-line help for commands	P	R	
B 14.02.07	Use file conversion	P	R	
B 14.02.08	Use data transfer	P	R	
EC 14.03.00	**Select entities for action**	**P**	**R**	**M**
B 14.03.01	Add or remove entities separately	P	R	
B 14.03.02	Add or remove entities using a window	P	R	
B 14.03.03	Add or remove entities with a crossing-box	P	R	
B 14.03.04	Select entities using a fence	P	R	
B 14.03.05	Select entities by other methods (e.g., last, previous, type, all)	P	R	
EC 14.04.00	**Create 2-D orthographic drawings**	**P**	**R**	**M**
B 14.04.01	Draw using construction aides (e.g., snaps, grid, snap)	P	R	
B 14.04.02	Edit drawing entity properties (e.g., color, layer, thickness, linetype)	P	R	
B 14.04.03	Create layers	P	R	
B 14.04.04	Name layers	P	R	
B 14.04.05	Manipulate layers	P	R	
B 14.04.06	Save files	P	R	
B 14.04.07	Create back-ups	P	R	

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Code / Number	Unit/Competency/Builder	12	AD	AC
EC 14.05.00	**Annotate orthographic drawings**	**P**	**R**	**C**
B 14.05.01	Edit text styles	P	R	
B 14.05.02	Select text styles	P	R	
B 14.05.03	Apply notes	P	R	
EC 14.06.00	**Dimension orthographic drawings**	**P**	**R**	**CM**
B 14.06.01	Apply dimensions per standards	P	R	
B 14.06.02	Edit text	P	R	
B 14.06.03	Control dimension variables/models	P	R	
EC 14.07.00	**Control display**	**P**	**R**	**M**
B 14.07.01	Apply view control while drawing (e.g., zoom and pan)	P	R	
B 14.07.02	Control view resolution (e.g., viewers)	P	R	
B 14.07.03	Display views	P	R	
EC 14.08.00	**Extract entity and drawing information**	**P**	**R**	**M**
B 14.08.01	Measure distances	P	R	
B 14.08.02	Measure areas	P	R	
B 14.08.03	Identify locations	P	R	
B 14.08.04	List entity characteristics (e.g., length, size, location, properties)	P	R	

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Code / Number	Unit/Competency/Builder	12	AD	AC
U 15.00.00	**Intermediate CADD (The Competencies in this Unit meet or exceed the applicable sections of the National Occupational Skill Standards developed by the National Coalition for Advanced Manufacturing (NACFAM). Sources - CADD - Computer Aided Drafting &**			
EC 15.01.00	**Manage symbols and attributes**	**I**	**P**	
B 15.01.01	Create blocks/cells/templates	I	P	
B 15.01.02	Create nested blocks/templates/cells		P	
B 15.01.03	Insert blocks and drawings/templates/cells		P	
B 15.01.04	Redefine blocks/templates/cells		P	
B 15.01.05	Edit blocks/templates/cells	I	P	
B 15.01.06	Create/apply/modify attributes		P	
EC 15.02.00	**Create 2-D isometric drawings**	**P**	**R**	**M**
B 15.02.01	Explain isometric projection	P	R	
B 15.02.02	Manipulate isometric snap and grid settings	P	R	
B 15.02.03	Toggle isometric planes (e.g., left, right, top)	P	R	
B 15.02.04	Create text styles for each plane	P	R	
B 15.02.05	Create dimension styles	P	R	
B 15.02.06	Create isometric ellipses	P	R	

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EC	**15.03.00**	**Use external/internal routines**	**I**	**P**	
B	15.03.01	Export CAD files	I	P	
B	15.03.02	Import CAD files	I	P	
B	15.03.03	Export text/graphic files		P	
B	15.03.04	Import text/graphic files		P	

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Code / Number	Unit/Competency/Builder	12	AD	AC
U 16.00.00	**Basic Electricity**			
EC 16.01.00	**Demonstrate proficiency in electrical fundamentals**	**P**	**R**	**CMS**
B 16.01.01	Identify electronic components and schematic symbols	P	R	
B 16.01.02	Describe basic atomic structure and its relationship to electricity	P	R	
B 16.01.03	Describe the relationship between electrical and magnetic properties	P	R	
B 16.01.04	Describe the electrical and magnetic properties of a magnet	P	R	
B 16.01.05	Describe the photoelectric effect	P	R	
B 16.01.06	Describe the thermocouple effect	P	R	
B 16.01.07	Use scientific and engineering notations to solve electronic unit problems	P	R	
B 16.01.08	Identify sources of electricity	P	R	
B 16.01.09	Describe principles and operations of electrochemical supplies	P	R	
B 16.01.10	Describe voltage, current, resistance, power, and energy	P	R	
B 16.01.11	Apply Ohm's Law	P	R	
B 16.01.12	Apply Kirchoff's Laws	P	R	
B 16.01.13	Apply power formulas	P	R	
B 16.01.14	Explain Thevenin's Theorem	P	R	
B 16.01.15	Explain Norton's Theorem	P	R	
B 16.01.16	Interpret color codes and symbols to identify electrical components and values	P	R	
B 16.01.17	Measure properties of circuits using test equipment	P	R	
B 16.01.18	Describe electrostatic discharge (ESD) procedures	P	R	

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Code / Number		Unit/Competency/Builder	12	AD	AC
EC	**16.02.00**	**Demonstrate proficiency in DC circuits**	**P**	**R**	**CMS**
B	16.02.01	Compute conductance of conductors and insulators	P	R	
B	16.02.02	Measure resistance of conductors and insulators	P	R	
B	16.02.03	Measure properties of a circuit using volt-ohm meter (VOM) and digital volt-ohm meter (DVM)	P	R	
B	16.02.04	Build series, parallel, and combination circuits	P	R	
B	16.02.05	Build bridge circuits	P	R	
B	16.02.06	Build voltage divider circuits (loaded and unloaded)	P	R	
B	16.02.07	Compute voltage divider circuits (loaded and unloaded)	P	R	
B	16.02.08	Describe magnetic properties of circuits and devices	P	R	
B	16.02.09	Explain physical and electrical characteristics of capacitors and inductors	P	R	
B	16.02.10	Describe RC and RL time constants	P	R	
B	16.02.11	Compute RC and RL time constants	P	R	
B	16.02.12	Demonstrate use of diodes in DC circuits	P	R	
B	16.02.13	Identify need for rectification	P	R	
B	16.02.14	Operate power supplies for DC circuits	P	R	
B	16.02.15	Construct DC circuits that demonstrate maximum power transfer theory	P	R	
B	16.02.16	Use meters	P	R	
B	16.02.17	Use oscilloscopes	P	R	
B	16.02.18	Measure current, voltage, and resistance in DC circuits	P	R	
B	16.02.19	Explain simple DC generator action	P	R	
B	16.02.20	Explain simple DC motor action	P	R	
B	16.02.21	Explain principles of solid-state switching devices	P	R	
B	16.02.22	Solve algebraic problems to include exponentials (prerequisite to DC) (algebraic calculation)	P	R	

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Code / Number		Unit/Competency/Builder	12	AD	AC
B	16.02.23	Identify classes, voltage ratings and/or polarity of electronic components	P	R	
B	16.02.24	Identify use of circuit protective devices (e.g., fuses, breakers)	P	R	
B	16.02.25	Troubleshoot DC circuits	P	R	

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Code / Number	Unit/Competency/Builder	12	AD	AC
EC 16.03.00	**Demonstrate proficiency in AC circuits**	**I**	**P**	**CMS**
B 16.03.01	Analyze properties of an AC signal	P	R	
B 16.03.02	Describe principles and operation of characteristics of sinusoidal and non-sinusoidal wave forms	I	P	
B 16.03.03	Identify AC sources	P	R	
B 16.03.04	Describe principles and characteristics of capacitive circuits	P	R	
B 16.03.05	Operate capacitive circuits	P	R	
B 16.03.06	Describe principles and characteristics of inductive circuits	P	R	
B 16.03.07	Operate inductive circuits	P	R	
B 16.03.08	Describe principles and operation of transformers	P	R	
B 16.03.09	Demonstrate operation of AC circuits utilizing transformers	P	R	
B 16.03.10	Use maximum power transfer theorems	I	P	
B 16.03.11	Use Thevenin's and Norton's theorems to analyze AC circuits	I	P	
B 16.03.12	Measure power in AC circuits	I	P	
B 16.03.13	Operate capacitor and inductor meters for AC circuits	I	P	
B 16.03.14	Operate differentiators and integrators to determine RC and RL time constants	I	P	
B 16.03.15	Describe principles and characteristics of series and parallel resonant circuits	I	P	
B 16.03.16	Construct series and parallel resonant circuits	I	P	
B 16.03.17	Identify classes, voltage, ratings and/or polarity of electronic components	I	P	
B 16.03.18	Identify use of circuit protective devices (e.g., fuses, breakers)	I	P	
B 16.03.19	Describe principles and characteristics of frequency selective filter circuits	I	P	
B 16.03.20	Use logarithms to obtain gain (dB) using calculator/computer	I	P	

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Code / Number		Unit/Competency/Builder	12	AD	AC
B	16.03.21	Operate frequency selective filter circuits	I	P	
B	16.03.22	Operate polyphase circuits	I	P	
B	16.03.23	Describe basic motor theory and operation	P	R	
B	16.03.24	Describe basic generator theory and operation	P	R	
B	16.03.25	Operate power supplies for AC circuits	P	R	
B	16.03.26	Describe principles and operation of various power conditioning (e.g., isolation transformers, surge suppressors, uninterruptable power systems)	I	P	
B	16.03.27	Describe principles and operation of various safety grounding systems (e.g., lightning arresters, ground electrostatic discharge, fault interrupters, etc.)	I	P	
B	16.03.28	Describe characteristics of inductors in series and parallel circuits	I	P	
B	16.03.29	Describe characteristics of capacitance in series and parallel circuits	I	P	
B	16.03.30	Compare resistive-capacitive (RC) and resistive-inductive (RL) time constants (TC)	I	P	
B	16.03.31	Measure voltage, current, time, frequency (F), and phase relationships of AC sine wave signal	I	P	
B	16.03.32	Describe frequency (F) and phase relations	P	R	
B	16.03.33	Describe resonance of inductive-capacitive (LC) circuits	I	P	
B	16.03.34	Calculate impedance match and maximum transfer of power	I	P	
B	16.03.35	Measure current, voltage, and resistance in AC circuits	P	R	
B	16.03.36	Explain simple AC generator action	P	R	
B	16.03.37	Explain simple AC motor action	P	R	
B	16.03.38	Calculate power factor in AC circuits	I	P	
B	16.03.39	Explain harmonics and its effects on power quality	I	P	
B	16.03.40	Solve basic trigonometric problems as applicable to electronics	P	R	

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Code / Number		Unit/Competency/Builder	12	AD	AC
B	16.03.41	Calculate peak (PK), root mean square (RMS), and average values	P	R	
B	16.03.42	Troubleshoot AC circuits	I	P	
B	16.03.43	Differentiate between U.S. and various foreign electrical standards	I	P	

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Code / Number	Unit/Competency/Builder	12	AD	AC
U 17.00.00	**Fundamentals of Electronics Technology**			
EC 17.01.00	**Demonstrate proficiency in discrete solid-state devices**	**I**	**P**	**CMS**
B 17.01.01	Describe properties of semiconductor materials	P	R	
B 17.01.02	Describe operating characteristics and applications of PN junctions	P	R	
B 17.01.03	Demonstrate operation of diode circuits	P	R	
B 17.01.04	Troubleshoot diode circuits	P	R	
B 17.01.05	Repair diode circuits	P	R	
B 17.01.06	Describe operating characteristics and applications of bipolar transistors	P	R	
B 17.01.07	Describe operating characteristics and basic applications of field effect transistors (e.g., FET + s/MOSFET + s)	I	P	
B 17.01.08	Describe operating characteristics and application of special diodes/transistors	I	P	
B 17.01.09	Describe operating characteristics and basic applications of opto-electronic devices (e.g., gate isolators, interrupt sensors, infrared sensors)	I	P	
B 17.01.10	Describe operating characteristics and basic applications of single-stage amplifiers	P	R	
B 17.01.11	Demonstrate the operation of the single-stage amplifiers	P	R	
B 17.01.12	Troubleshoot single-stage amplifiers	P	R	
B 17.01.13	Repair single-stage amplifiers	P		
B 17.01.14	Demonstrate the operation of thyristor circuitry (SCR, TRIAC, DIAC, etc.)	I	P	
B 17.01.15	Troubleshoot thyristor circuitry (SCR, TRIAC, DIAC, etc.)	I	P	
B 17.01.16	Construct circuits based on solid state devices	I	P	
B 17.01.17	Use test equipment to measure and troubleshoot solid state based circuits	I	P	

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Code / Number	Unit/Competency/Builder	12	AD	AC
RC 17.02.00	**Describe the basic manufacturing and packing process of integrated circuits**	**I**	**R**	**CMS**
B 17.02.01	Describe the manufacture of electronic product chips and integrated circuits	I		
B 17.02.02	Describe the advantages and disadvantages of various advanced packaging techniques (e.g., SMD, MCM)	I		
B 17.02.03	List properties of electronic packaging materials	I		
B 17.02.04	Describe joining and assembly of electronic components	I		
B 17.02.05	Describe coating and etching processes	I		
B 17.02.06	List principles of packaging electronic components	I		
B 17.02.07	Describe manufacture of miniature devices	I		
B 17.02.08	Describe testing of joints	I		
B 17.02.09	Describe reliability of electronic product testing	I		
B 17.02.10	Describe methods of fabrication	I	R	
EC 17.03.00	**Distinguish between analog and digital phenomena and circuits**	**I**	**P**	**CMS**
B 17.03.01	Describe the analog and digital measurement techniques of physical parameters (e.g., temperature, time, current, number of items coming down a production line)	I	P	
B 17.03.02	Distinguish between an analog and a digital clock	I	P	
B 17.03.03	Describe the instruments used to measure analog signals	I	P	
B 17.03.04	Describe the instruments used to measure digital signals	I	P	

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Code / Number	Unit/Competency/Builder	12	AD	AC
U 18.00.00	**Electronic Noise (The Competencies in this Unit meet or exceed the applicable sections of the National Occupational Skill Standards developed by the Electronic Industries Association and the Electronics Industries Foundation. Source - Raising the St**			
EC 18.01.00	**Identify sources of electronic noise**	**I**	**P**	**C**
B 18.01.01	Define and explain intrinsic noise sources	I	P	
B 18.01.02	Define and explain active and passive device noise		P	
B 18.01.03	Explain conductively coupled noise		P	
B 18.01.04	Explain common impedance noise coupling	I	P	
B 18.01.05	Explain noise coupling by electric and magnetic fields	I	P	
EC 18.02.00	**Explain how to measure electronic noise**	**I**	**P**	**C**
B 18.02.01	Explain the use of "The Decibel" in noise characterization	I	P	
B 18.02.02	Explain the standard "Noise Units" and weighing functions		P	
B 18.02.03	Explain signal to noise ratios	I	P	
EC 18.03.00	**Explain techniques used to reduce electronic noise**	**I**	**P**	**C**
B 18.03.01	Explain noise reduction at the source		P	
B 18.03.02	Explain noise coupling reduction		P	
B 18.03.03	Explain noise reduction at the "Receiver"		P	
B 18.03.04	Explain grounding techniques	I	P	
B 18.03.05	Explain shielding techniques	I	P	
B 18.03.06	Explain opto-electric isolation	I	P	

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Code / Number	Unit/Competency/Builder	12	AD	AC
U 19.00.00	**Analog Circuits (The Competencies in this Unit meet or exceed the applicable sections of the National Occupational Skill Standards developed by the Electronic Industries Association and the Electronics Industries Foundation. Source - Raising the Sta**			
RC 19.01.00	**Demonstrate proficiency in analog circuits**		I	
B 19.01.01	Describe operating characteristics and applications of sinusoidal and non-sinusoidal oscillator circuits		I	
B 19.01.02	Demonstrate the operation of oscillator circuits		I	
B 19.01.03	Describe the operating characteristics and applications of motor phase-shift control circuits (single-phase and multi-phase)		I	
EC 19.02.00	**Explain linear power supply regulator circuits**	I	P	CMS
B 19.02.01	Explain the need for voltage and current regulation	I	P	
B 19.02.02	Explain how a fast linear regulator can reduce ripple		P	
B 19.02.03	Explain how the linear voltage regulator can be made adjustable		P	
EC 19.03.00	**Describe linear power amplifiers**	I	P	CMS
B 19.03.01	Define a linear amplifier	I	P	
B 19.03.02	Explain the use and operation of D.C. servo motor drivers		P	
B 19.03.03	Explain the use and operation of audio power amplifiers	I	P	
B 19.03.04	Explain what is meant by the bandwidth of power amplifiers	I	P	
B 19.03.05	Explain the transient response of power amplifiers		P	
B 19.03.06	Explain phase distortion in power amplifiers		P	

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Code / Number		Unit/Competency/Builder	12	AD	AC
EC	**19.04.00**	**Describe operational amplifiers**	**I**	**P**	**CMS**
B	19.04.01	Explain the significance of high open circuit gain	I	P	
B	19.04.02	Explain the significance and characteristics of the summing junction	I	P	
B	19.04.03	Explain offset and its adjustment	I	P	
B	19.04.04	Explain the significance of differential inputs		P	
B	19.04.05	Explain the unity gain buffer and line driver	I	P	
B	19.04.06	Explain the analog voltage adder/subtractor		P	
B	19.04.07	Describe/implement a current amplifier		P	
B	19.04.08	Describe/implement a charge amplifier		P	
B	19.04.09	Describe/implement an integrator		P	
B	19.04.10	Describe/implement a differentiator		P	
B	19.04.11	Describe/implement a single pole low pass filter	I	P	
B	19.04.12	Prepare a Bode plot for a single pole low pass filter		P	
EC	**19.05.00**	**Describe instrumentation amplifiers**	**I**	**P**	**CMS**
B	19.05.01	Explain how an instrumentation amplifier differs from a simple operational amplifier	I	P	
B	19.05.02	Describe the signal types, levels, and environments that require instrumentation amplifiers for signal processing	I	P	
B	19.05.03	Explain the significance of balanced input impedance		P	
B	19.05.04	Demonstrate how an instrumentation amplifier can be constructed from operational amplifiers		P	
B	19.05.05	Describe the characteristics of the resistors needed to make an instrumentation amplifier from an operational amplifier		P	

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Code / Number		Unit/Competency/Builder	12	AD	AC
EC	**19.06.00**	**Describe analog active filters**	**I**	**P**	**CM**
B	19.06.01	Describe need and uses of electronic active filters		P	
B	19.06.02	Describe a single pole low pass filter	I	P	
B	19.06.03	Describe a single pole high pass filter	I	P	
B	19.06.04	Describe a band pass filter	I	P	
B	19.06.05	Describe multi-pole low pass filters		P	

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Code / Number	Unit/Competency/Builder	12	AD	AC
U 20.00.00	**Digital Logic Circuits (The Competencies in this Unit meet or exceed the applicable sections of the National Occupational Skill Standards developed by the Electronic Industries Association and the Electronics Industries Foundation. Source - Raising**			
EC 20.01.00	**Use binary arithmetic**	**I**	**P**	**M**
B 20.01.01	Identify features of positional numbering systems		P	
B 20.01.02	Identify mathematical forms of notation		P	
B 20.01.03	Perform number system conversions (e.g., binary to decimal, octal to binary, binary to hexadecimal)	I	P	
B 20.01.04	Perform binary mathematical operations (e.g., addition, subtraction)		P	
B 20.01.05	Use coded systems (e.g., BCD-Binary Coded Decimal)	I	P	
B 20.01.06	Demonstrate binary code for decimal numerals 0-9	I	P	
EC 20.02.00	**Use Boolean algebra**	**P**	**R**	**M**
B 20.02.01	Explain basic functions of Boolean algebra	P	R	
B 20.02.02	Identify signal levels that represent Boolean algebra	P	R	
B 20.02.03	Perform Boolean operations	P	R	
B 20.02.04	Write Boolean theorems	P	R	
B 20.02.05	Draw light switching schematic circuits for OR, AND, NOT and exclusive OR	P	R	
B 20.02.06	Draw logic diagrams For OR, AND, NOT, exclusive OR	P	R	
B 20.02.07	Draw truth tables for OR, AND, NOT, and exclusive OR	P	R	

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EC 20.03.00	**Explain digital logic elements**	**P**	**R**	**M**
B 20.03.01	Differentiate between types of digital logic families	P	R	
B 20.03.02	Describe digital logic gates, AND, OR, NOT	P	R	
B 20.03.03	Describe R-S (Reset-Set) flip-flops	P	R	
B 20.03.04	Describe J-K clocked flip-flops	P	R	
B 20.03.05	Describe shift registers	P	R	
B 20.03.06	Describe encoders and decoders	P	R	
B 20.03.07	Describe the binary full adder	P	R	
EC 20.04.00	**Explain digital logic and pulse circuits**	**P**	**R**	**M**
B 20.04.01	Implement the exclusive OR circuit using AND, OR, and NOT gates	P	R	
B 20.04.02	Describe digital counters	P	R	
B 20.04.03	Describe digital clocks and timers	P	R	
B 20.04.04	Describe the schmidt trigger	P	R	
B 20.04.05	Describe the monostable (single shot) multivibrator	P	R	
B 20.04.06	Describe the astable (free running) multivibrator	P	R	

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RC 20.05.00	**Demonstrate proficiency in digital circuits**	**I**	**R**	
B 20.05.01	Demonstrate the operation of encoders and decoders	I	R	
B 20.05.02	Describe the principles and operation of basic types of multiplexer and demultiplexer circuits	I	R	
B 20.05.03	Demonstrate the operation of mulitplexer and demultiplexer circuits	I	R	
B 20.05.04	Describe the principles and operation of digital-to-analog and analog-to-digital circuits	I	R	
B 20.05.05	Demonstrate the operation of digital-to-analog and analog-to-digital circuits	I	R	
B 20.05.06	Describe the principles and operation of basic types of digital display circuits	P	R	
B 20.05.07	Demonstrate the operation of digital display circuits	P	R	
B 20.05.08	Describe the basic types of digital display devices	P	R	

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Code / Number	Unit/Competency/Builder	12	AD	AC
U 21.00.00	**Microcomputer Electronics Technology**			
EC 21.01.00	**Demonstrate basic proficiency in microcomputer systems**	**I**	**P**	**CMS**
B 21.01.01	Describe essential components of microcomputers and their functions	I	P	
B 21.01.02	Describe principles and operation of BUS concepts (e.g., VESA, EISA)	I	P	
B 21.01.03	Describe the principles and operation of basic types of memory circuits	I	P	
B 21.01.04	Identify operating systems (e.g., DOS, OS/2, UNIX)	I	P	
B 21.01.05	Describe microprocessor instructions sets	I	P	
B 21.01.06	Describe principles and operation of microprocessor machine code	I	P	
B 21.01.07	Demonstrate the use of microprocessor machine code	I	P	
B 21.01.08	Describe principles and operation of storage devices (e.g. disk drives, CD ROMS)	I	P	
B 21.01.09	Interface input and output ports to peripherals	I	P	
B 21.01.10	Identify central processing unit building blocks and their uses	I	P	
B 21.01.11	Identify the levels of computer languages	I	P	

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EC 21.02.00	**Demonstrate basic proficiency in computer systems architecture**	**I**	**P**	**C**
B 21.02.01	Describe the principles and operation of computer system architecture	I	P	
B 21.02.02	Describe the principles and operation of addresses and interrupts	I	P	
B 21.02.03	Describe the principles and operation of volatile and non-volatile memory	I	P	
B 21.02.04	Demonstrate the use of volatile and non-volatile memory	I	P	
B 21.02.05	Repair or replace volatile and non-volatile memory	I	P	
B 21.02.06	Interpret basic computer acronyms	P	R	
B 21.02.07	Describe priorities and interrupts at systems level	I	P	
B 21.02.08	Troubleshoot a microcomputer system	I	P	
B 21.02.09	Describe the principles and operation of advanced memory techniques		P	
B 21.02.10	Define individual system blocks		P	

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EC 21.03.00	**Demonstrate proficiency in software fundamentals**	**I**	**P**	**CM**
B 21.03.01	Load operating system software	I	P	
B 21.03.02	Load diagnostic software	I	P	
B 21.03.03	Run diagnostic software	I	P	
B 21.03.04	Construct flow charts	I	P	
B 21.03.05	Analyze flow charts	I	P	
B 21.03.06	Identify the need for backup	P	R	
B 21.03.07	Describe security measures	I	P	
B 21.03.08	Describe virus protection	I	P	
B 21.03.09	Explain computer languages and their uses	I	P	
B 21.03.10	Write a simple computer program	I	P	
B 21.03.11	Write program documentation	I	P	
B 21.03.12	Describe firmware applications		P	
EC 21.04.00	**Describe elements of communication interfacing**	**I**	**P**	**C**
B 21.04.01	Define common EIA, IEEE, and CCITT communication standards (e.g., EIA 232 and 485; IEEE 488)		P	
B 21.04.02	Identify sync devices	I	P	
B 21.04.03	Identify async devices	I	P	
B 21.04.04	Identify types of network (e.g., token ring, ethernet)	I	P	
B 21.04.05	Identify networking levels or layers	I	P	
B 21.04.06	Identify basic protocols	I	P	
B 21.04.07	Operate network analysis devices	I	P	
B 21.04.08	Identify network analysis devices (e.g., breakout boxes, sniffers)	I	P	
B 21.04.09	Identify multiuser systems		P	

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Code / Number	Unit/Competency/Builder	12	AD	AC
U 22.00.00	**Instrumentation Control Technology**			
RC 22.01.00	**Describe instrument loops**	**I**	**P**	**CMS**
B 22.01.01	Describe modes of control operation (e.g., manual, automatic, cascade, program		P	
B 22.01.02	Describe details of temperature elements (thermocouples and RTD's) and transmitters		P	
B 22.01.03	Describe details of infrared and photosensors	I	P	
B 22.01.04	Describe details of proximity/vibration sensors		P	
B 22.01.05	Describe details of speed/acceleration sensorsI	I	P	
B 22.01.06	Describe details of linear variable differential transformers (LVDT)		P	
B 22.01.07	Describe elements of a control loop (e.g., transmitter, indicator, controller, transducer, control valve)		P	
RC 22.02.00	**Build control loops**	**I**	**P**	
B 22.02.01	Build flow loop		P	
B 22.02.02	Build level control loop	I	P	
B 22.02.03	Build pressure loop		P	
B 22.02.04	Build temperature loop		P	
RC 22.03.00	**Calibrate loop elements**	**I**	**P**	**CMS**
B 22.03.01	Set up test procedure	I	P	
B 22.03.02	Perform calibration		P	
B 22.03.03	Record results		P	

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Code / Number	Unit/Competency/Builder	12	AD	AC
RC 22.04.00	**Describe distributed control systems**	**P**	**R**	**CMS**
B 22.04.01	Describe various types of Input/Output (I/O) Signals	P	R	
B 22.04.02	Describe various types of alarms	P	R	
B 22.04.03	Describe system architecture	P	R	
RC 22.05.00	**Describe types of controller action**	**I**	**P**	**CMS**
B 22.05.01	Describe proportional control action (P)	I	P	
B 22.05.02	Describe proportional and integral control action (PI)		P	
B 22.05.03	Describe proportional, integral, and derivative control action (PID)		P	
RC 22.06.00	**Perform loop tuning**	**I**	**P**	
B 22.06.01	Demonstrate effect of using only a proportional parameter	I	P	
B 22.06.02	Demonstrate effect of using only proportional and integral parameters		P	
B 22.06.03	Demonstrate effect of various values for proportional, integral, and derivative tuning parameters		P	

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U 23.00.00	**Electro-optic Technology**			
EC 23.01.00	**Demonstrate knowledge of light principles**	**I**	**P**	**S**
B 23.01.01	Describe the characteristics of light sources	I	P	
B 23.01.02	Describe the properties of light	I	P	
B 23.01.03	Demonstrate the properties of light	I	P	
EC 23.02.00	**Demonstrate knowledge of optical systems**	**I**	**P**	**S**
B 23.02.01	Describe the characteristics and properties of optical materials	I	P	
B 23.02.02	Describe the use of optical components (e.g., lenses, beam splitters)	I	P	
B 23.02.03	Describe the principles and operation of optical systems (e.g., ray tracing, refraction)	I	P	
B 23.02.04	Demonstrate the use of optical systems (e.g., convergence, focusing, divergence)	I	P	
B 23.02.05	Troubleshoot optical systems	I	P	
B 23.02.06	Describe the advantages and disadvantages of fiber optics	I	P	
EC 23.03.00	**Demonstrate knowledge of lasers**	**I**	**P**	**S**
B 23.03.01	Describe the principles of laser operations (e.g., population inversion, coherence)	I	P	
B 23.03.02	Describe laser classifications	I	P	
B 23.03.03	Describe the principles and operation of powering and pumping lasers	I	P	
B 23.03.04	Describe spatial characteristics	I	P	
B 23.03.05	Describe laser safety	P	R	

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RC 23.04.00	**Describe laser energy applications**	**I**	**R**	**S**
B 23.04.01	Describe the principles and operation of ion lasers	I	R	
B 23.04.02	Describe the principles and operation of solid lasers	I	R	
B 23.04.03	Describe the principles and operation of semiconductor lasers	I	R	
B 23.04.04	Describe the principles, operation, and applications of lasers	I	R	

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U 24.00.00	**Electronics Troubleshooting and Repair**			
EC 24.01.00	**Demonstrate troubleshooting skills**	**I**	**P**	**CMS**
B 24.01.01	Explain role of preventive maintenance	I	P	
B 24.01.02	Differentiate normal and abnormal operations	I	P	
B 24.01.03	Explain troubleshooting procedures	I	P	
B 24.01.04	Explain logical actions taken to troubleshoot	I	P	
B 24.01.05	Use proper troubleshooting aids	I	P	
B 24.01.06	Demonstrate knowledge of safety rules for troubleshooting and repair procedures	P	R	
B 24.01.07	Maintain troubleshooting and repair records	I	P	
B 24.01.08	Use manufacturer's manuals, schematics, and troubleshooting charts	I	P	
B 24.01.09	Isolate faults, shorts, and open circuits	I	P	
RC 24.02.00	**Maintain hand tools**	**P**		
B 24.02.01	Demonstrate use and care of measuring devices (e.g., rules, tapes, calipers, micrometers, multimeter, thermometer, and coordinate measuring system)	P		
B 24.02.02	Demonstrate use and care of common hand tools	P		

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EC 24.03.00	**Apply troubleshooting techniques to AC circuits**	**I**	**P**	**MS**
B 24.03.01	Isolate faults in capacitive circuits	I	P	
B 24.03.02	Isolate faults in inductive circuits	I	P	
B 24.03.03	Isolate faults in AC circuits utilizing transformers (e.g., step up and step down)	I	P	
B 24.03.04	Isolate faults in differentiator and integrator circuits	I	P	
B 24.03.05	Isolate fault sin RC, RL and RLC circuits	I	P	
B 24.03.06	Isolate faults in frequency selective filter circuits	I	P	
B 24.03.07	Isolate faults to AC variable frequency drive systems	I	P	
B 24.03.08	Repair faults	I	P	
EC 24.04.00	**Apply troubleshooting techniques to DC circuits**	**I**	**P**	**CMS**
B 24.04.01	Identify noise problems	I	P	
B 24.04.02	Isolate faults in series, parallel and series parallel	I	P	
B 24.04.03	Isolate faults in bridge circuits	I	P	
B 24.04.04	Isolate faults in DC power supplies	I	P	
B 24.04.05	Isolate faults to DC drive system	I	P	
B 24.04.06	Isolate faults in voltage divider circuits	I	P	
B 24.04.07	Repair faults	I	P	

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EC	**24.05.00**	**Apply troubleshooting techniques in discrete solid-state devices**	**I**	**P**	**MS**
B	24.05.01	Isolate faults in diode circuits	P	R	
B	24.05.02	Isolate faults in thyristor circuitry (e.g., SCR, TRIAC, DIAC)	I	P	
B	24.05.03	Isolate faults in transistor circuits	P	R	
B	24.05.04	Isolate faults in operational amplifier circuits	I	P	
B	24.05.05	Isolate faults in single-stage amplifiers	P	R	
B	24.05.06	Repair faults	I	P	
EC	**24.06.00**	**Apply troubleshooting techniques to analog circuits**	**I**	**P**	**MS**
B	24.06.01	Isolate faults in single and multistage amplifiers	I	P	
B	24.06.02	Isolate faults in audio power amplifier	I	P	
B	24.06.03	Isolate faults in regulated and switching power supply circuits	I	P	
B	24.06.04	Isolate faults in active filter circuits	I	P	
B	24.06.05	Isolate faults in oscillator circuits	I	P	
B	24.06.06	Isolate faults in operational amplifier circuits	I	P	
B	24.06.07	Isolate faults in power supplies (loaded and unloaded) and filters	I	P	
B	24.06.08	Repair faults	I	P	

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Code / Number		Unit/Competency/Builder	12	AD	AC
EC	**24.07.00**	**Apply troubleshooting techniques to digital circuits**	**I**	**P**	**S**
B	24.07.01	Identify noise problems	I	P	
B	24.07.02	Isolate faults in multiplexer and demultiplexer circuits	I	P	
B	24.07.03	Isolate faults in digital display circuits	I	P	
B	24.07.04	Isolate faults in logic gates	I	P	
B	24.07.05	Isolate faults in flip-flops	I	P	
B	24.07.06	Isolate faults in registers and counters	I	P	
B	24.07.07	Isolate faults in clock and timing circuits	I	P	
B	24.07.08	Isolate faults in arithemetic-logic circuits	I	P	
B	24.07.09	Isolate faults in encoders and decoders	I	P	
B	24.07.10	Isolate faults in digital-display devices	I	P	
B	24.07.11	Repair faults	I	P	

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Code / Number	Unit/Competency/Builder	12	AD	AC
EC 24.08.00	**Apply troubleshooting techniques to a microcomputer system**	**I**	**P**	**MS**
B 24.08.01	Isolate faults to systems boards	I	P	
B 24.08.02	Isolate faults to memory circuits	I	P	
B 24.08.03	Isolate faults to data storage devices	I	P	
B 24.08.04	Isolate faults in power supplies	I	P	
B 24.08.05	Troubleshoot I/O ports	I	P	
B 24.08.06	Isolate faults in I/O interface circuitry	I	P	
B 24.08.07	Use diagnostic software	I	P	
B 24.08.08	Repair faults	I	P	
B 24.08.09	Troubleshoot a mouse	I	P	
B 24.08.10	Troubleshoot printers and interface controllers (including laser printers)	I	P	
B 24.08.11	Troubleshoot display terminals and interface controllers (including touch screens)	I	P	
EC 24.09.00	**Apply troubleshooting and repair techniques to manufacturing systems**	**I**	**P**	
B 24.09.01	Identify individual process blocks of assembly line or process		P	
B 24.09.02	Identify process block interfaces		P	
B 24.09.03	Demonstrate steps required for efficient systems troubleshooting		P	
B 24.09.04	Isolate system faults to process block		P	
B 24.09.05	Isolate block faults using schematics	I	P	
B 24.09.06	Isolate block faults using programmable controller indicators		P	
B 24.09.07	Isolate block faults using volt meter	I	P	
B 24.09.08	Repair block faults by replacing fault component or wiring	I	P	

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Code / Number		Unit/Competency/Builder	12	AD	AC
RC	**24.10.00**	**Apply troubleshooting techniques to electronic devices**	**I**	**R**	
B	24.10.01	Analyze problem	I	R	
B	24.10.02	Use technical documentation	I	R	
B	24.10.03	Develop a functional block diagram from system documentation	I	R	
B	24.10.04	Use block diagram to isolate problem	I	R	
B	24.10.05	Perform visual inspection	I	R	
B	24.10.06	Perform electrical tests to isolate problem	I	R	
B	24.10.07	Determine feasibility of repair	I	R	
B	24.10.08	Take corrective action	I	R	
B	24.10.09	Verify proper operation	I	R	
B	24.10.10	Prepare corrective action report	I	R	

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Code / Number	Unit/Competency/Builder	12	AD	AC
U 25.00.00	**Programmable Logic Controllers (PLCs)**			
RC 25.01.00	**Explain basic applications of PLCs**		**P**	**CM**
B 25.01.01	Describe basic applications of PLCs		P	
B 25.01.02	Identify program symbols and language functions		P	
B 25.01.03	Describe function of block transfers		P	
B 25.01.04	Describe operation of timers, counters, and sequences		P	
B 25.01.05	Describe operation of discrete and analog I/O modules		P	
B 25.01.06	Describe the principles and operation of PLCs		P	
RC 25.02.00	**Demonstrate use of PLCs**		**I**	**CMS**
B 25.02.01	Draw block diagram of a PLC		P	
B 25.02.02	Define individual blocks of a PLC		P	
B 25.02.03	Use operator's and/or manufacturer's manual(s)		I	
B 25.02.04	Translate relay logic to logic for a PLC		P	
B 25.02.05	Use function or block transfers		I	
B 25.02.06	Operate timers, counters and sequencers		P	
B 25.02.07	Operate discrete and analog I/O modules		I	
B 25.02.08	Install a PLC		I	
B 25.02.09	Connect controller to sensors		I	
B 25.02.10	Write a statement and ladder logic program		I	
B 25.02.11	Use a PLC program		I	
B 25.02.12	Troubleshoot a program for a PLC		I	
B 25.02.13	Repair a program for a PLC		I	

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Code / Number	Unit/Competency/Builder	12	AD	AC
U 26.00.00	**Communications Electronics Technology**			
RC 26.01.00	**Describe transmission line applications**	**I**	**R**	**CMS**
B 26.01.01	Explain power conversion between electrical and optical	I	R	
B 26.01.02	Describe principles and operation of two wire and four wire transmission lines	I	R	
B 26.01.03	Describe principles and operation of coaxial cable	I	R	
B 26.01.04	Describe principles and operation of microwaves and wave guides	I		
B 26.01.05	Describe principles and operation of fiber optics	I	R	

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Code / Number		Unit/Competency/Builder	12	AD	AC
RC	**26.02.00**	**Demonstrate basic proficiency in data communications**	**I**	**R**	
B	26.02.01	Describe principles and operation of data communications, signaling systems, codes, formats and protocols	I	R	
B	26.02.02	Describe principles and operation of parallel and serial ports	I	R	
B	26.02.03	Describe principles and operation of synchronous and asynchronous signals	I	R	
B	26.02.04	Describe principles and operation of data modems	I	R	
B	26.02.05	Operate data modems	I	R	
B	26.02.06	Describe principles and operation of fax machines	I	R	
B	26.02.07	Describe principles and operation of types of carrier systems (e.g., wire, COAX, fiber-optic)	I	R	
B	26.02.08	Describe principles and operation of various types of networks (e.g., ethernet, token ring)	I	R	
B	26.02.09	Demonstrate operation of various types of networks	I	R	
B	26.02.10	Describe proper techniques for cable termination (e.g., UTP, COAX, FIBER)	I	R	
B	26.02.11	Demonstrate proper techniques for cable termination	I	R	
B	26.02.12	Describe principles and operation of telephones	I	R	
B	26.02.13	Describe principles and operation of digital multiplexing systems (e.g., ISDN, T-1, fiber)	I	R	

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Code / Number	Unit/Competency/Builder	12	AD	AC
U 27.00.00	**Industrial Electricity**			
EC 27.01.00	**Explain basic industrial electricity theory**	**P**	**R**	**CMS**
B 27.01.01	Describe atomic structure and its relationship to electricity	P	R	
B 27.01.02	Describe the relationship between electrical and magnetic properties	P	R	
B 27.01.03	Describe the electrical and magnetic properties of a magnet	P	R	
B 27.01.04	Describe the photoelectric effect	P	R	
B 27.01.05	Describe the thermocouple effect	P	R	
B 27.01.06	Describe the electrical effect of friction	P	R	
B 27.01.07	Identify sources of electricity	P	R	
B 27.01.08	Identify potential sources of electricity	P	R	
B 27.01.09	Describe differences between AC/DC	P	R	
B 27.01.10	Describe effects varying degrees of electricity have on the human body	P	R	
EC 27.02.00	**Use the National Electrical Code (NEC), International and OSHA Codes**	**I**	**P**	
B 27.02.01	Use NEC to identify correct materials		P	
B 27.02.02	Use NEC to identify correct methods		P	
B 27.02.03	Use NEC to identify correct applications		P	
B 27.02.04	Use NEC to identify correct safety procedures	I	P	
B 27.02.05	Identify and use European Economic Commission (EEC) codes		P	
B 27.02.06	Use lock-out, tag-out procedures	I	P	
B 27.02.07	Identify hazardous areas	I	P	

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Code / Number	Unit/Competency/Builder	12	AD	AC
EC 27.03.00	**Explain operation of electrical distribution systems**	**I**	**P**	**S**
B 27.03.01	Follow NEC, local, state, and national codes		P	
B 27.03.02	Describe functions of permits and licensing requirements		P	
B 27.03.03	Explain generation of electricity	I	P	
B 27.03.04	Explain transmission of electricity	I	P	
B 27.03.05	Explain end user distribution		P	
EC 27.04.00	**Maintain basic electrical systems**	**P**	**R**	**S**
B 27.04.01	Replace electrical cords	P	R	
B 27.04.02	Replace batteries	P	R	
B 27.04.03	Replace fuse(s)	P	R	
B 27.04.04	Replace switches and other sensors	P	R	
B 27.04.05	Replace plugs and sockets	P	R	
B 27.04.06	Replace control panel components (e.g., relays, motor starters)	P	R	
B 27.04.07	Replace AC motors (e.g., 3 phase, single phase)	P	R	
B 27.04.08	Replace DC motors	P	R	

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Code / Number		Unit/Competency/Builder	12	AD	AC
EC	**27.05.00**	**Interpret electrical/electronic drawings**	**P**	**R**	**S**
B	27.05.01	Interpret basic electric/electronic standards and symbols (e.g., IEC, IEEE)	P	R	
B	27.05.02	Interpret schematic drawings	P	R	
B	27.05.03	Interpret cable drawings	P	R	
B	27.05.04	Interpret component drawings	P	R	
B	27.05.05	Interpret logic diagrams	P	R	
B	27.05.06	Interpret control panel drawings	P	R	
B	27.05.07	Interpret connection drawings	P	R	
B	27.05.08	Interpret interconnection drawings	P	R	
B	27.05.09	Interpret printed circuit board drawings	P	R	
B	27.05.10	Interpret harness drawings	P	R	
B	27.05.11	Interpret package drawings	P	R	
B	27.05.12	Interpret mechanical/electronic production drawings and assembly drawings	P	R	

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Code / Number	Unit/Competency/Builder	12	AD	AC
EC 27.06.00	**Demonstrate proficiency in direct current (DC) circuits**	**P**	**R**	**CMS**
B 27.06.01	Describe voltage, current, resistance, power, and energy	P	R	
B 27.06.02	Solve algebraic problems to include exponential (prerequisite to DC)	P	R	
B 27.06.03	Measure properties of a circuit using volt-ohm meter (VOM) and digital volt-ohm meter (DVM) meters and oscilloscopes	P	R	
B 27.06.04	Apply Ohm's Law	P	R	
B 27.06.05	Construct parallel circuits	P	R	
B 27.06.06	Construct series circuits	P	R	
B 27.06.07	Construct series parallel and bridge circuits	P	R	
B 27.06.08	Define voltage divider circuits (loaded and unloaded)	P	R	
B 27.06.09	Construct DC circuits that demonstrate the maximum power transfer theory	P	R	
B 27.06.10	Solve problems in electrical units utilizing metric units	P	R	
B 27.06.11	Describe the principles and operation of electrochemical supplies	P	R	
B 27.06.12	Apply Kirchhoff's laws	P	R	
B 27.06.13	Interpret color codes and symbols to identify electrical components and values	P	R	
B 27.06.14	Measure properties of a circuit using analog and digital meters and oscilloscopes	P	R	
B 27.06.15	Measure conductance and resistance of conductors and insulators	P	R	
B 27.06.16	Describe magnetic properties of circuits and devices	P	R	
B 27.06.17	Describe the physical and electrical characteristics of capacitors and inductors	P	R	
B 27.06.18	Describe RC and RL time constants	P	R	
B 27.06.19	Set up power supplies for DC circuits	P	R	

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Code / Number		Unit/Competency/Builder	12	AD	AC
B	27.06.20	Operate power supplies for DC circuits	P	R	
B	27.06.21	Apply Thevenin's and Norton's theorems	P	R	

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Code / Number	Unit/Competency/Builder	12	AD	AC
EC 27.07.00	**Demonstrate proficiency in alternating current (AC) circuits**	**I**	**P**	**CMS**
B 27.07.01	Solve basic trigonometric problems as applicable to electricity (prerequisite to AC)	I	P	
B 27.07.02	Analyze AC signals utilizing VOM, DVM, oscilloscope, frequency counter, and function generator		P	
B 27.07.03	Analyze power in AC circuits	I	P	
B 27.07.04	Measure power in AC circuits		P	
B 27.07.05	Operate capacitor and inductor analyzers for AC circuits		P	
B 27.07.06	Analyze properties of an AC signal	I	P	
B 27.07.07	Describe the principles and operation of the characteristics of sinusoidal and non-sinusoidal wave forms	I	P	
B 27.07.08	Identify AC sources	I	P	
B 27.07.09	Describe the principles and operation of the characteristics of capacitive circuits	I	P	
B 27.07.10	Demonstrate the operation of capacitive circuits	I	P	
B 27.07.11	Describe the principles and operation of the characteristics of inductive circuits	I	P	
B 27.07.12	Demonstrate the operation of inductive circuits	I	P	
B 27.07.13	Describe the principles and operation of the principles of transformers	I	P	
B 27.07.14	Demonstrate the operation of AC circuits utilizing transformers	I	P	
B 27.07.15	Operate differentiators and integrators to determine RC and RL time constants		P	
B 27.07.16	Describe the principles and operation of the characteristics of RLC circuits (series, parallel, and complex)	I	P	
B 27.07.17	Demonstrate the operation of RLC circuits (series, parallel, and complex)	I	P	
B 27.07.18	Describe the principles and operation of the characteristics of series and parallel resonant circuits	I	P	

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Code / Number		Unit/Competency/Builder	12	AD	AC
B	27.07.19	Operate series and parallel resonant circuits	I	P	
B	27.07.20	Describe the principles and operation of the characteristics of frequency selective filter circuits	I	P	
B	27.07.21	Demonstrate the operation of frequency selective filter circuits	I	P	
B	27.07.22	Operate polyphase circuits		P	
B	27.07.23	Describe basic motor theory and operation	I	P	
B	27.07.24	Describe basic generator theory and operation	I	P	
B	27.07.25	Operate power supplies for AC circuits	I	P	
B	27.07.26	Describe the principles and operation of various power conditioning (e.g., isolation transformers, surge suppressors, uninterruptable power systems)		P	
B	27.07.27	Describe the principles and operation of various safety grounding systems (e.g., lightning arresters, ground fault interrupters)	I	P	
B	27.07.28	Apply maximum power transfer theorems	I	P	
B	27.07.29	Apply Thevenin's and Norton's theorems to analyze AC networks	I	P	
B	27.07.30	Identify harmonics problems	I	P	
B	27.07.31	Correct harmonics problems		P	

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Code / Number	Unit/Competency/Builder	12	AD	AC

U 28.00.00 Electrical Test and Measurement Equipment

EC	28.01.00	**Demonstrate proficient use of electrical test equipment**	P	R	CMS
B	28.01.01	Describe function and operation of logic probe and logic analyzer	P	R	
B	28.01.02	Describe function and operation of signal generator	P	R	
B	28.01.03	Describe function and operation of time-domain reflectometer (TDR)	P	R	
B	28.01.04	Describe function and operation of AC/DC hi-pot	P	R	
B	28.01.05	Describe function and operation of spectrum analyzer	P	R	
B	28.01.06	Describe function and operation of megger	P	R	
B	28.01.07	Describe function and operation of curve tracer	P	R	
B	28.01.08	Apply basic test equipment to DC circuits	P	R	
B	28.01.09	Apply basic test equipment to AC circuits	P	R	
B	28.01.10	Apply basic test equipment to solid-state devices	P	R	
B	28.01.11	Apply basic test equipment to digital circuits	P	R	
B	28.01.12	Apply basic test equipment to analog circuits	P	R	
B	28.01.13	Apply basic test equipment to microprocessors	P	R	

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Code / Number		Unit/Competency/Builder	12	AD	AC
EC	**28.02.00**	**Demonstrate proficient use of electrical measurement equipment**	**P**	**R**	**CMS**
B	28.02.01	Describe function and operation of analog volt-ohm-meter (AVOM)	P	R	
B	28.02.02	Describe function and operation of digital volt-ohm-meter (DVOM)	P	R	
B	28.02.03	Describe function and operation of amp probe	P	R	
B	28.02.04	Describe function and operation of oscilloscopes	P	R	
B	28.02.05	Apply measurement equipment to DC circuits	P	R	
B	28.02.06	Apply measurement equipment to AC circuits	P	R	
B	28.02.07	Apply measurement equipment to solid-state devices	P	R	
B	28.02.08	Apply measurement equipment to digital circuits	P	R	
B	28.02.09	Apply measurement equipment to analog circuits	P	R	
B	28.02.10	Apply measurement equipment to microprocessors	P	R	

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Code / Number	Unit/Competency/Builder	12	AD	AC
U 29.00.00	**Electromechanical Technology**			
RC 29.01.00	**Demonstrate proficiency in motors and motor controls**		I	
B 29.01.01	Test solid state DC motor control circuits		I	
B 29.01.02	Test solid state AC motor control circuits		I	
B 29.01.03	Identify SCR and TRIAC AC control circuits	I	P	
B 29.01.04	Explain revolving fields in AC motors		I	
B 29.01.05	Describe operation of common AC motors		P	
B 29.01.06	Describe operation of variable frequency AC drives		I	
B 29.01.07	Define advantages and disadvantages of common DC motors		I	
B 29.01.08	Explain how motor load affects speed regulation		I	
B 29.01.09	Describe operation of stepper motors		P	
B 29.01.10	Describe speed control of various types of motor drives using sensors		I	
B 29.01.11	Describe regenerative dynamic breaking		I	
B 29.01.12	Describe operation of various feedback loops		I	

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Code / Number	Unit/Competency/Builder	12	AD	AC
U 30.00.00	**Hydraulics and Pneumatics**			
EC 30.01.00	**Describe fluid flow concepts**	**I**	**P**	**MS**
B 30.01.01	Explain Pascal's Law	I	P	
B 30.01.02	Explain Boyle's Law	I	P	
B 30.01.03	Explain Bernoulli's Principle	I	P	
B 30.01.04	Describe flow velocity	I	P	
B 30.01.05	Explain how heat and pressure relate to power and transmission	I	P	
B 30.01.06	Describe physical and chemical properties of a fluid	I	P	
B 30.01.07	Describe fluids in motion in closed conductors	I	P	
B 30.01.08	Describe continuity of mass flow	I	P	
B 30.01.09	Identify types of fluids	I	P	
B 30.01.10	Identify properties of fluids	I	P	
B 30.01.11	Identify English and metric units of measurement for pressure, density, and viscosity	I	P	
EC 30.02.00	**Describe energy considerations**	**I**	**P**	**MS**
B 30.02.01	Differentiate work and power	I	P	
B 30.02.02	Differentiate potential and kinetic energy	I	P	
B 30.02.03	Explain energy conservation concept	I	P	
B 30.02.04	Explain hydraulic horsepower	I	P	
B 30.02.05	Explain work of compression in compressible fluids	I	P	

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Code / Number		Unit/Competency/Builder	12	AD	AC
RC	**30.03.00**	**Describe system losses**	**I**	**P**	
B	30.03.01	Differentiate turbulent and laminar flow		P	
B	30.03.02	Explain friction factor		P	
B	30.03.03	Explain pressure losses		P	
B	30.03.04	Identify potential system losses (e.g., leaks, wear, component sizing, heat, dirt)	I	P	
RC	**30.04.00**	**Calculate energy**	**I**	**P**	
B	30.04.01	Apply Pascal's Law	I	P	
B	30.04.02	Apply Bernoulli's Principle	I	P	
B	30.04.03	Apply Boyle's Law	I	P	
B	30.04.04	Calculate work and power	I	P	
B	30.04.05	Calculate potential and kinetic energy	I	P	
B	30.04.06	Calculate hydraulic horsepower	I	P	
B	30.04.07	Calculate flow velocity and pressure	I	P	
B	30.04.08	Calculate pressure losses	I	P	

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RC = Local Competency (may have been
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I = Introduce
P = Proficient (able to perform without supervision)
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C, M, S = Communications, Math or Science related

Code / Number	Unit/Competency/Builder	12	AD	AC
U 31.00.00	**Computer Aided Engineering**			
RC 31.01.00	**Describe printed circuit board process**	**P**		
B 31.01.01	Differentiate between a multi-layer and two-sided board	P		
B 31.01.02	Explain various etching processes	P		
B 31.01.03	Describe steps in creating and producing PC board	P		
B 31.01.04	Describe through hole us. surface mount	P		
B 31.01.05	Describe soldering methods	P		
RC 31.02.00	**Use CADD program to lay out a PC Board**	**I**	**R**	
B 31.02.01	Construct board layout using schematics	I	R	
B 31.02.02	Describe function of an auto router (Windows based)	P	R	
B 31.02.03	Use auto router	I	R	
RC 31.03.00	**Use CADD program to create schematics**	**I**	**R**	
B 31.03.01	Draw simple circuits using a CADD program	P	R	
B 31.03.02	Modify library parts	I	R	
B 31.03.03	Create library parts	I	R	
RC 31.04.00	**Use a circuit analysis program (SPICE, PALASM, Electronics Workbench) to analyze circuit behavior**	**I**	**I**	
B 31.04.01	Identify nodes on schematic	I		
B 31.04.02	Create a text file to describe the circuit and define the analysis to be performed		I	
B 31.04.03	Develop a circuit analysis net list from schematic		I	

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U 32.00.00 Wiring Methods

RC	32.01.00	**Demonstrate knowledge of wiring techniques**	I	R
B	32.01.01	Describe functions of permits, codes, and licensing requirements	I	R
B	32.01.02	Interpret prints	I	R
B	32.01.03	Identify proper color coding	I	R
B	32.01.04	Describe ground bonding systems	I	R
B	32.01.05	Describe various wire terminations	I	R
B	32.01.06	Make various wire terminations (soldering and crimping)	P	R

Code / Number	Unit/Competency/Builder	12	AD	AC
U 33.00.00	**Electronic Assembly and Repair**			
EC 33.01.00	**Perform basic soldering of electrical components**	**P**	**R**	
B 33.01.01	Prepare surfaces to be soldered	P	R	
B 33.01.02	Select appropriate solder	P	R	
B 33.01.03	Select appropriate flux	P	R	
B 33.01.04	Select appropriate soldering iron temperature	P	R	
B 33.01.05	Select appropriate soldering iron tip shape	P	R	
B 33.01.06	Select appropriate flux remover	P	R	
B 33.01.07	Select appropriate surface sealant	P	R	
B 33.01.08	Inspect solder joints under microscope	P	R	
B 33.01.09	Identify good and bad solder joints SMT and PTH	P	R	
B 33.01.10	Measure solder joint resistance of good and bad joints	P	R	
B 33.01.11	Demonstrate solder techniques for SMD components	P	R	
B 33.01.12	Demonstrate techniques for soldering to terminals	P	R	
RC 33.02.00	**Perform basic repair of electronic boards**	**I**	**R**	
B 33.02.01	Demonstrate removal of SMD	I		
B 33.02.02	Demonstrate removal of PTH components	I		
B 33.02.03	Demonstrate PCB track repair	I		
B 33.02.04	Demonstrate use of solder removal tools	I	R	

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Code / Number	Unit/Competency/Builder	12	AD	AC
U 34.00.00	**Local Area Network (LAN) Operations**			
RC 34.01.00	**Explain LAN operations**	**I**	**R**	
B 34.01.01	Define local area network	I	R	
B 34.01.02	Define different types of LANs	I		
B 34.01.03	Identity advantages and disadvantages of various LAN operating systems	I		
B 34.01.04	Define security levels	I		
RC 34.02.00	**Apply LAN Operations**	**I**	**R**	
B 34.02.01	Change hardware as needed	I	R	
B 34.02.02	Access the system in a multi-user environment	I	R	
B 34.02.03	Differentiate among various topologies	I	R	

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Code / Number	Unit/Competency/Builder	12	AD	AC
U 35.00.00	**Mechanical Power Transmission**			
RC 35.01.00	**Demonstrate knowledge of basic mechanics**	**I**	**P**	
B 35.01.01	Explain working forces of torque, tension, and compression	I	P	
B 35.01.02	Explain the laws of motion	I	P	
B 35.01.03	Explain how to calculate work in several ways	I	P	
B 35.01.04	Explain the function of simple machines including levers, inclined plane, wedge wheel and axle, pulley and screw, gears	I	P	
B 35.01.05	Explain the types of power and the method of producing power	I	P	
B 35.01.06	Explain the laws of frictions	I	P	
B 35.01.07	Explain mechanical efficiency	I	P	
B 35.01.08	Apply basic knowledge of physics	I	P	
B 35.01.09	Apply basic knowledge of stress, strain, and fatigue		P	
B 35.01.10	Calculate speed changes	I	P	

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Organization/Address: Lakeland Tech Prep Consortium 7700 Clocktower Dr. Kirtland, OH 44094-5198	Telephone: 440-953-7235 FAX: 440-975-4329 E-Mail Address: tsteinicke@lakeland.cc.oh.us Date: 9/1/99

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